ELECTRICAL REVIEW

[ILLUSTRATED]

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The "Remington" Arc-Light System.

The somewhat extended experience with the arc-system of electric lighting has led, as there was every reason to believe it would, to many and various improvements, and of these improved systems it may safely be said without the fear of contradiction that the "Remington" is one.

In the "Remington" we have a system of arc lighting adapted to practical illumination being devised with a view to making it suitable for general use.

By a practical system is meant one which combines cheapness of construction, reliability, and efficiency with simplicity.

To begin with, the dynamo is of simple construction, works smoothly and noiselessly with little heat and spark at the commutator. One of the principal, and indeed one of the most important features of this system is the adoption for the first time, we believe, of the repelling instead of the attracting force of magnetism, for the purpose of regulating the feeding of the carbon points in the lamps. This, as may readily be perceived, considerably augments the controlling influence of the derived or secondary circuit, the function of which is to maintain all the lamps of a series uniform, and has also the power, at the time of feeding, to arrest the downward movement of the upper or positive carbon before actual contact with the lower, and thus does away with that sputtering and flickering which is so unpleasant to the ear and troublesome to the eye.

Another feature of this system, and one which cannot fail to commend itself, is the interchangeableness of the parts which reduces whatever cost of repair there may be to a minimum, saves the trouble and expense of removing the apparatus to the factory in order to have its defective pieces refitted or renewed.

Practical electricians were employed by the "Remington Electric Light Company" to experiment with the arc-light as generally used, in order to find a means of correcting its imperfections, and, as will be admitted by the unprejudiced, they have admirably succeeded in effecting this object.

We illustrate herewith the twenty-light dynamo machine and the new perfected double carbon lamp without globe, of the "Remington Electric Light Company."

Carbons for Arc Lights.

Carbons for arc lights are formed, says a well-informed writer, by thoroughly incorporating a mixture of finely-divided carbonaceous materials, such as the purer forms of coke, or gas retort carbon with some liquid substance, such as oil, tar or sugar syrup, that, when subjected to a high temperature, is capable of being carbonized. The finely-divided ingredients are thoroughly mixed and made into a stiff paste with the carbonizable liquid, and then forced by heavy hydraulic pressure through circular apertures in plates. The continuous cylindrical rods thus obtained are cut into suitable lengths, carefully dried and then heated to incandescence in ovens while out of contact with air. By this process the carbonizable liquids are reduced to a carbon, which thoroughly binds together the various ingredients. Experience has shown that the higher the temperature and the greater the length of time during which the carbons are subjected to the baking process, the greater their hardness and the higher their electrical conductivity. In order to insure freedom from slight porosity, in most cases the carbons are subjected to a re-baking. After removal from the oven, they are soaked in strong syrup, and again placed in the oven and heated to incandescence as before.

International Exhibition to be Opened in London in May.

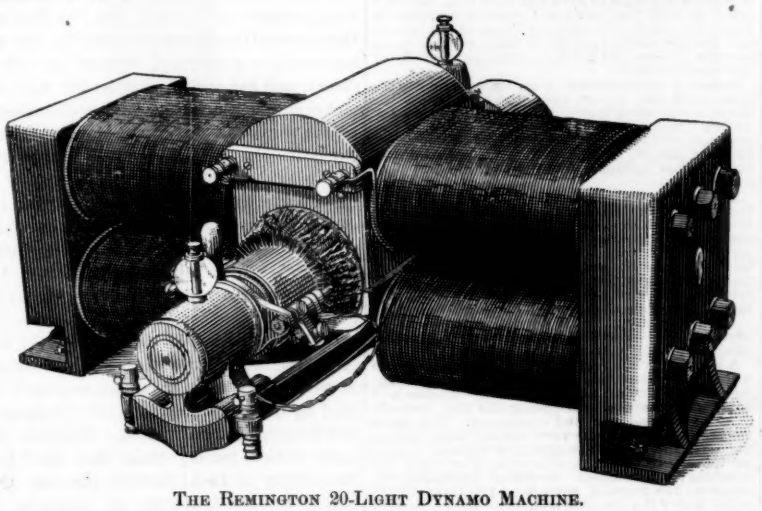
It is officially announced, through the British consulate, that an International Inventions Exhibition will be held in London in 1885.

It will be held under the patronage of the Queen, the presidency of the Prince of Wales, and the management of an executive council composed of eminent Englishmen.

It will be opened in May, at the Royal Horticultural Gardens, South Kensington, and will remain open until the end of the year.

In order that American inventions may occupy a prominent place in this universal exhibition, the latest date for receiving applications for space has been extended to December 31, 1884.

THE NEW PERFECTED DOUBLE CARBON LAMP, WITHOUT GLOBE.



THE REMINGTON 20-LIGHT DYNAMO MACHINE.

The exhibition will consist of two grand divisions, each of which will be subdivided into groups and classes. The first division, devoted to numerations, will embrace apparatus, appliances, processes, and products invented or brought into use since 1862, when the great World's Fair was held in the Crystal Palace.

The object of this collection is to show the progress that has been made during the last quarter of a century in the application of scientific discoveries to the purposes of daily life. There is ample scope for the display of American ingenuity, as exhibits will not be limited to important mechanical appliances and the utilization of natural products, but will also include Yankee notions of all descriptions.

The second division will be devoted to music in all its branches, chiefly musical instruments invented since the beginning of the present century. Historic collections of musical instruments, and of pictures representing musical subjects, will form an incidental feature of this exhibit. Medals in gold, silver and bronze, and diplomas of honor, will be awarded on the recommendation of juries.

Although the exhibition will not be open until May, the intervening months will be fully occupied with the necessary preparations by the managers and exhibitors. The allotment of space is one of the first essentials, and for this, notwithstanding the extension, the time is limited.

Acting in the spirit of international comity and of the wishes of his Government, the British consul in New York expresses the desire that inventors, manufacturers and others throughout the United States will immediately make application for the space they require in the exhibition buildings.

Blank forms for such application, together with detailed information for the guidance of exhibitors, will be forwarded free to all persons applying to Mr. J. Pierrepont Edwards, British Consul, New York. No charge will be made for space. The commission to be appointed by the President of the United States will represent the interests of American exhibitors.

A Scientific Library.

Professor Graham Bell had purchased from the heirs of the late Professor Henry the library of the deceased scientist. One of the terms of the sale was that the library should be kept intact, and as most of the works are old and rare it is considered a valuable acquisition by Professor Bell. There are about two thousand volumes in the collection, fully one-third of which treat of electricity, and many of them contain marginal notes in the handwriting of Professor Henry. One book on its last page contained the following commentary: "After a careful reading of this book I am inclined to believe that it is rather a negative contribution to science."

An octagonal room on the west side of the top floor of Professer Bell's residence has been selected for the accommodation of the Henry library, the room being finished in ash, while the bookcases are of oak, handsomely carved. An alcove, which commands an unobstructed view of Scott Statue and Massachusetts Avenue, looking west, will be utilized for placing in position a bust of Henry, and over the fireplace of the octagon room a life-sized painting of the great scientist will be displayed.

It would be difficult to imagine a cosier room, and when the frescoing of the ceiling and walls is completed, Professor Bell will have a private library second to none in the United States, at least so far as scientific works are concerned. A portierre separates his private library, containing upwards of a thousand volumes, from the Henry room, and conveniently near is the experimental apartment, which contains one of the finest galvanometers, made especially for Professor Bell by a Boston firm. It is in these rooms that Professor Bell carries on his business affairs, receives and answers correspondence and attends to the numerous details which make up his busy life. His laboratory is situated on Connecticut Avenue where he spends several hours daily, and frequently all night when an interesting subject is under examination.

At present Professor Bell is very much interested in a plan for the education of deaf mutes, and daily, from 11:30 A.M. to 1 P.M., he may be found at 1,234 Sixteenth Street, superintending the instruction of a class of five deaf children. Particular attention is paid to vocal physiology and the mechanism of speech, and in order that the pupils may be further instructed at home, classes for parents have been formed, which are lectured to by Professor Bell. This school is altogether experimental, and the system employed by Professor Bell is entitled, "Line Writing, by a Modified Form of Visible Speech." All the senses of the pupils are employed, those of touch and sight being particularly appealed to, and thus far the most gratifying results have been obtained.

Progress of Gen. Abbot's Investigations on Submarine Mines.

The annual report of the Chief of Engineers, U. S. A., for 1884, contains the following extracts from Gen. Abbot's report on the progress made by him in his investigations on submarine mines:

In the matter of new explosives, considerable progress has been made. After much difficulty and delay, a ton of explosive gelatine (without camphor) has been received from Nobel's Explosive Company, Limited, of Glasgow; and the experiments to compare it with the camphorated sample of home manufacture formerly tested, and to accurately determine its fitness for the torpedo service, are now in progress. They already indicate that, in explosive intensity of action under water, the uncamphorated material is decidedly the stronger, and, indeed, is the strongest explosive ever tested at Willets' Point. At the request of the Chief of Ordnance, a sample was transferred to that department for trial in shell-firing from cannon at the proving ground at Sandy Hook. Ring trials have been completed with two grades of Atlas powder, and are now in progress with two grades of Judson powder and an improved quality of Rackarock, to test their relative merits in subaqueous work. Forty-three explosions have been already measured, and it is expected to complete the tests of these powders, and perhaps of another new variety, during the present season.

The general results with Atlas powder are the following: It is manufactured by the Repauno Chemical Company, at Gibbstown, New Jersey. Grade A is reported to contain 75 per cent. of nitro-glycerine and 25 per cent. of a compound base mostly composed of wood fiber. Grade B is reported to contain 50 per cent. of nitro-glycerine and 50 per cent. of an explosive base, chiefly composed of nitrate of soda and wood fiber. Fourteen shots (giving eighty-four gauge records) were fired in the rings with each variety, and the analysis indicates that grade A is precisely equal to dynamite No. 1 in explosive intensity of action when fired under water, and that grade B has 99 per cent. of the same strength under the same conditions. The small difference between the two grades is surprising, considering the different chemical compositions, and it can only be affirmed for subaqueous explosions. There is considerable difference in price between the two grades, and the powder is worthy of the attention of officers of the corps directing blasting operations.

At the Electrical Exhibition at Vienna, in 1883, the Danish submarine mining service exhibited a platinum wire fuse of extraordinary sensitiveness, far exceeding any made before that date. A novel system of operating mines, not without promise of practical value, was based upon this peculiarity, and it appeared important to us to turn our attention in this direction. Samples of the Danish fuses, or of their wire, could not be procured; but I have finally succeeded in making, from materials obtained in this country, fuses considerably more sensitive than those exhibited at Vienna. The Danish fuses were thus reported: Diameter of bridge wire, in millimeters, from 0 00 5 to 0.000675; length of bridge wire, 11 millimeters, of which 2 millimeters have the above fine gauge; resistance, from 9 to 14 ohms; firing current, from 0.38 to 0.05 amperes.

The following table exhibits the electrical tests of a sample of similar uses made last April at Willets' Point from American wire:

TESTS OF SENSITIVE PLATINUM FUSES.

Number of Fuse.	Resistance in ohms cold.	Current in amperes to redden bridge.
1	...	0 021
2	57	0.022
3	75	0.020
4	57	0.020
5	54	0.022
6	76	0.020
7	80	0.018
8	51	0.025

These figures prove that we have succeeded in making a fuse uniform in action and of unequaled sensitiveness, which will enable us to experiment with various new modes of operating mines, and to introduce any favorable results into our service.

The Waldumer Electro-Magnetic Brake at Work.

Our contempopary, the *Railway Review*, says, regarding the above brake, that they have on several occasions given space to accounts of the Waldumer Electro-Magnetic Brake. Notably at the time of the exhibition of its workings on the model train at the Railway Exposition At that time the brake was awarded the gold medal, and the company owning the patents has since been demonstrating practically what was then shown in model. It has now a train of ten cars and a caboose fitted up with the brake on the Cincinnati, Washington & Baltimore division of Baltimore & Ohio, and the following reports, from officials who have watched its workings there, are valuable testimonials of its practical efficiency in regular railway service. We append the reports of Joseph Ramsey, chief engineer of the Cincinnati, Hamilton & Dayton, and of J. E. Rose, master of transportation of the Cincinnati, Washington & Baltimore, together with an approving letter from General Manager J. H. Stewart, of the latter road:

LETTER OF GENERAL MANAGER STEWART.

OFFICE OF THE GEN. MANAGER,
CINCINNATI, WASH & BALT. R. R. Co.,
CINCINNATI Nov. 18, 1884.

L. W. Goss, Esq., General Manager Waldumer Electro-Magnetic Brake Company, 17 West Third St., Cincinnati, Ohio.

DEAR SIR:—I beg to hand you herewith, a letter from our master of transportation, Mr. J. E. Rose, with reference to the workings of your Brake, and, in this connection, will add that I am very glad to say that I fully concur with Mr. Rose as to the value and practicability of your brake. Yours truly

(Signed), J. H. STEWART, Gen. Man.

REPORT OF MASTER OF TRANSPORTATION ROSE.

OFFICE OF MASTER OF TRANSPORTATION,
CINCINNATI, WASH. & BALT. R. R. Co.,
CINCINNATI, Nov. 15, 1884.

J. H. Stewart, Esq., Gen. Man.

DEAR SIR:—In accordance with your advice, and in order to first test the mechanical durability of the Waldumer Electro-Magnetic Brake device, caboose No. 34 of the Cincinnati, Washington & Baltimore Railroad was fitted up with one of said brakes, on May 3, of this year The brake having stood the wear and tear of continued daily railroad service of 125 miles per day on our main line, for months, a full train of 10 of our new coal cars was fitted up with the same and ready for operation about October 1. These coal cars are of our largest and heaviest pattern, each weighing, empty, on an average, 11 tons, and having a tonnage capacity of 40,000 pounds each.

Repeated experimental runs on our road were made, and the power and practicability of the electric brake thus tested on our heaviest grades Among these tests was one made October 8, in the presence of Col. Smith, the president of our road, yourself, myself, and representative railroad officials of the Cincinnati, Hamilton and Dayton Railroad.

These preliminary tests have been entirely satisfactory, the train has been sent to the coal fields at Wellston and Zaleski a distance of about 150 miles east, loaded with coal, and brought back to Cincinnati On these runs the hand-brake has not been used; the electric brake doing all the work, the train being under the perfect control of the engineer, the action of the engineer being signaled by the conductor by electric signal from the caboose.

The testimony of all the train men coincides with my own observation as to the remarkable efficiency of this system

A very important feature of this continuous brake is that when the train parts, and thereby breaks the electric current, a bell rings in the caboose and another in the cab, announcing the fact immediately to both engineer and conductor. This alone ought to prevent many very serious accidents, as the cars cannot separate three feet without sounding these bells, which continue to ring until the coupling is again intact. In case of separation the brake on the forward portion of the train still remains under the absolute control of the engineer.

This train is in constant service on our road, and this brake is doing its work effectively and giving perfect satisfaction.

On November 3, the loaded train, with your car attached to the rear, made a test stop on our grade west of Norwood station, in 53 seconds from the time of application of this brake. The grade at this place is 68 feet to the mile; steam was used down the grade until the brake was applied, the speed of the train being at least forty-five miles per hour

The simultaneous application of the shoes to all the wheels of the car in this train makes these stops as smooth and easy, to say the least, as the best stops made by short passenger-car trains with the most improved air brakes. In fact, these stops may be classed as remarkable in this respect when you consider that these freight cars are fitted up with the common link and pin coupler, and have no buffer other than the ordinary draw-head. These draw-heads do not even strike together when stops are made; whatever distance apart they may be upon the application of the brake, that distance they remain.

The release of the brake is instantaneous and perfect.

The power is so thoroughly regulated that I have never yet seen a sliding wheel while the electric brake is being used.

In conclusion, permit me to say that the Waldumer Electric Brake appears to answer all the requirements of a continuous brake for short or long trains; and it seems to me that, from its construction, it ought to be reasonable in first cost. I also believe that it will be durable and comparatively inexpensive to keep in repair. Respectfully submitted. J. E ROSE,

(signed), Master of Transportation.

REPORT OF CHIEF ENGINEER RAMSEY.

OFFICE OF THE CHIEF ENGINEER
OF THE CINCINNATI, HAMILTON & DAYTON R. R.
CINCINNATI, October 21, 1884.

C. C. Waite, Esq., Vice-President.

DEAR SIR:—Pursuant to your request, I was present at a trial of the Waldumer Electro-Magnetic Brake on the 8th inst. on the Cincinnati, Washington & Baltimore railroad. A train of coal cars and a caboose was fitted up with the electric brake, drawn by an engine with tank attached, and having coupled to the rear the director's car of the Cincinnati, Washington & Baltimore railroad. No brakes were applied to the engine, tank, or to the director's car

The train was run from Cincinnati to Norwood station, and the Cincinnati, Washington & Baltimore railroad, and the test of the brake was on a down grade of 68 feet to the mile. In the presence of yourself, W. F. Stark, assistant general superintendent, Samuel Stevenson, general passenger agent, and myself, representing the Cincinnati, Hamilton & Dayton Railroad, and Orland Smith, president, J. H. Stewart, general manager, J. E. Rose, master of transportation of the Cincinnati, Washington & Baltimore Railroad, besides some 30 other spectators

Mr. Stark and myself ascertained the running speed of the train, at the first stop on this grade, to be forty-eight miles per hour at the time the brake was applied.

The time for making a dead stop from the instant the train was flagged for a danger stop, when the brake was applied, 37½ seconds, and the distance exactly 445 yards.

The second stop was made with the special car detached, so that the entire train, except the engine and tender, had the brake on. The stop was made in thirty-five seconds: distance, 410 yards, estimated.

The application of the brake to the wheels was very speedy, and as nearly simultaneous on all the wheels as could be determined by observation only, there being no closing up of the rear cars, or bumping, or jerking, the stops being unusually smooth and easy. The brake seemed especially adapted for holding trains to a uniform speed on long grades, as the friction of the brake is regulated by the strength, which is under the full control of the engineer, and can be set at a constant strength, or increased or decreased as desired.

The signaling between cab and caboose, and the warning given when train is parted, is, or would be a very valuable feature of the brake.

As a trial of its powers, as a continuous train brake, I consider it a successful one. As regards the question of economy and durability, time alone would settle that, but my opinion is that both would be satisfactory. Respectfully,

(Signed), JOS. RAMSEY, Jr., Engineer.

Luck.

Our contemporary, the *Times*, in discussing the above subject, says:

"Who elected President Cleveland is a question that admits of several answers. The Democrats are of the opinion that they had something to do with carrying this State, and the Blaine organs seem to be divided in opinion as to whether Cleveland's victory was due to the independents, the prohibitionists, the stalwarts or Mr. Burchard. The question is now, however, settled beyond any reasonable doubt. It was a black cat that secured the triumph of the Cleveland ticket.

"About the beginning of the campaign a strange black cat walked into the National Democratic Headquarters in this city. She was apparently a public cat, without any lawful owner, and her arrival was hailed with immense enthusiasm. Cleveland stock instantly rose in the betting market; but on Wednesday after the election the cat disappeared, and with her, of course, all certainty of Cleveland's success. On the following Friday the cat reappeared, and convinced the committee that she intended to "see them through"—as the phrase runs. From that moment no further doubt as to the result remained.

"That a strange black cat carries the very best kind of luck with her into whatever house receives her with proper respect is denied by no one except a scientific agnostic or a bigoted general infidel. Scientific persons, indeed, usually claim that there is no such thing as luck, thereby showing their narrow-minded ignorance of anything not laid down in scientific text-books. The public knows better. Thousands of instances could be quoted which prove that migratory black cats are simply full of good luck. A black cat entered the house of a well-known cashier of this city one day, and three days later he was enabled to go to Canada with a carpet-bag overflowing with negotiable securities. It was immediately after the advent of a black cat that a citizen of Long Island City who had bet twenty-five hundred dollars on Blaine's election was asked by the Cleveland better to consider the bet off. Only last week a householder of this city employed a plumber to repair a faucet the day after a black cat had joined the household, and that plumber was run over and killed on his way home, before he had time to make out a bill and bankrupt the householder. Men who deny that there is any luck in black cats are either deplorably ignorant or utterly reckless, and in neither case are worthy of any attention.

"Why a black cat should bring luck into a household is not very clear. In investigating the question, it must be conceded at the start that we do not know whether luck is due to a microbe or to something else. That fact, however, does not hinder us from knowing the conditions which are favorable to luck. One of these unquestionably is the presence of electricity. We have merely to look at the career of Franklin, Morse and Edison to perceive that luck is closely associated with electricity, and there is no doubt that in regions where the presence of electricity is shown by frequent and severe thunderstorms luck is far more abundant than it is elsewhere.

"Where, let us ask, are gold nuggets found? Not in the northern regions, where thunderstorms are infrequent, but in Australia or the lands bordering on the tropics—regions where thunderstorms of tremendous violence are of constant occurrence. Where are diamonds found—in England or perhaps Maine? On the contrary, they are found in Brazil, South Africa and Golconda, where streams of electricity, eighteen inches in diameter, and thunder claps capable of breaking windows at a distance of ninety-seven miles, are the rule rather than the exception. According to Virgil, Æneas was accustomed to his dying day to maintain that luck and thunderstorms went together, and the experience of hundreds of men who have collected $5,000 of fire insurance on three thousand dollar houses destroyed by lightning confirms this opinion.

"Whether the electricity itself is favorable to the development of luck, or whether luck is germinated by the ozone produced by an electrical discharge, is uncertain. This, however, is a mere matter of detail. That electricity, either directly or indirectly, promotes good luck is probably the explanation of the intimate connection between black cats and luck. The amount of electricity contained in a black cat is enormous. It is estimated, in the case of an ordinary-sized animal, to be no less than two thousand ohms, and it increases at the rate of two hundred ohms for every additional ounce of cat. When the cat is stroked, or when she comes in contact with a conductor of any sort, a certain amount of electricity—say, fifteen ohms—is discharged, and constant discharges of this kind must very soon fill the atmosphere of the house with ozone. If, then, it be true that electricity or ozone is one of the conditions favorable to luck—and this has been already satisfactorily shown—we can understand why a black cat carries luck with her. It is, of course, possible that Cleveland might have been elected without a black cat at the Democratic headquarters, but in all probability the presence of that cat was worth more than all the efforts made by the National Democratic Committee."

A Galvanic Element With Direct or Indirect Action.

Plates coated on one side with sheets of caoutchouc are made into flat boxes by bending the caoutchouc up over the edge. These boxes are then filled with peroxide of lead, or with the same substance previously reduced. The boxes are covered with perforated plates, held in their places with slips of caoutchouc, and are placed opposite to each other in acidified water. Or the boxes may be filled with lead amalgam, which is oxidised by a current on the one hand and reduced on the other.

Phosphorescence of the Diamond.

Experiments have lately been made with a diamond of 92 carats, which is one of the finest known outside of royal or national collections. It is of wonderfully pure water, and is admirably cut with 64 perfectly geometrical facets. Its value is estimated at $60,000. When exposed during an hour to the rays of the sun, it preserved for more than twenty minutes, in a dark chamber, a light sufficient to show the white paper that reflected its rays The same phenomenon was exhibited, but with somewhat less intensity, after having submitted the diamond to a powerful electric light. A very apparent phosphorescence was also produced by rubbing the diamond for a few moments with flannel.

The New "Law Prism" Battery.

AN INGENIOUS IMPROVEMENT OF THE "LAW OPEN-CIRCUIT BATTERY" BY WHICH ECONOMY AND EFFICIENCY ARE HAPPILY COMBINED.

If everybody was rich and costliness did not frighten the general consumer, then each one would hasten to supply himself with whatever contributed to his convenience or served to lighten or shorten his labors. But unhappily the general public are poor, and no matter how convenient a contrivance is, the many, if it be expensive, must deprive themselves of it, and its projectors cannot hope to dispose of it save to the few who are possessed of a superabundant supply of means. This is readily seen in the multitude of ingenious but costly articles that flood the market, and for which there is only a limited demand and a restricted sale. Exhaustive treatises explaining their merits and advantages are, from time to time, printed and distributed, but the general public though not denying their truth, show an absolute indifference to their existence for the very good reason that they cannot afford to purchase them.

The primary battery has for years been looked upon as in many ways an inestimable boon, but altogether too expensive for general domestic purposes, and it is, therefore, with not a little pleasure we illustrate and describe to the readers of the New York ELECTRICAL REVIEW, the new "Law Prism" battery which is made by the Law Telephone Company of this city, and supplied to the general public at a cost, considering its efficiency, ludicrously low. It is designed for use for the thousand and one things to which electricity is now applied. Some of the most important of these usages are in connection with telephony, gas lighting, burglar alarms, electric clocks, annunciators, electric bells and medical apparatus. Indeed, it will be found of unusual efficiency with everything requiring the presence of an open circuit battery. It is efficient and simple, inexhaustible and indestructible. The new design of screwing on the top which is readily accomplished by a one-half turn cannot fail to commend itself and be appreciated by the telephone people.

Messrs. Childs and Shaw have shown great ingenuity and skill in the construction of the cover and its mode of fastening.

The price of the battery complete is only $1.50, and this and the fact that it does not require sealing and unsealing has created a large demand for it among those who heretofore have not been in the market as purchasers.

The positive pole of the "Law" battery becomes neither consumed nor exhausted. This is not, like the "guarantees" of the general shop-keeper, an empty promise to be evaded upon occasion. On the contrary, we have authority for saying that the projectors and manufacturers of the "Law" battery will replace, without charge, each and every exhausted positive pole returned to them, and will pay all the costs of transportation of the same. The importance of this assurance will, without doubt, be appreciated by those who use such batteries and who are, therefore, aware how expensive they have found the constant renewal of positive poles.

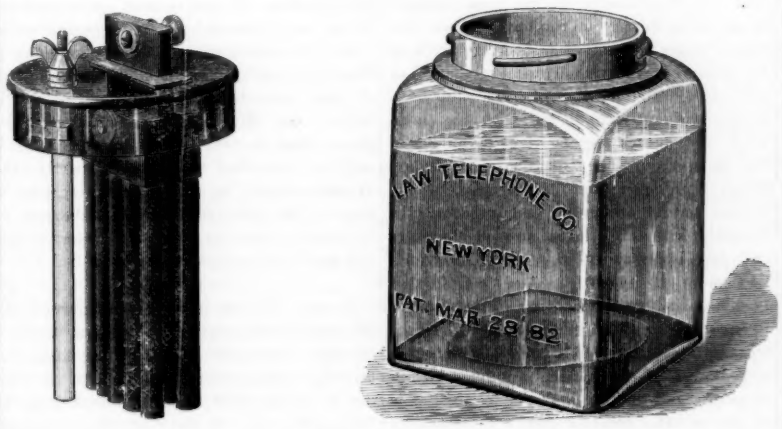
The "Law" battery has no brass and iron screws so apt to corrode, no manganese or chlorine are contained in prism or porous cup, no numerous and heavy carbons to easily get loose or break the lid.

For this and other reasons all main or branch lines of telephone, if they do not soon use this battery would find it to their advantage to give it a trial as a transmitter battery. It is uniform of action, and whether it be new or old, remains constant, only requiring that the zinc or solution be renewed at proper intervals, just as a clock, to keep good time, requires to be wound up at times. It is this faculty of serving without deteriorating or lessening of powers that serves to make this battery so invaluable where open circuit batteries are required, and for this, if for no other reasons, the "Law" battery is gradually becoming popular for gas lighting, burglar alarms, call bells, annunciators, clocks and the like. How many batteries have been discarded because of the continual attention they required!

If batteries which at first threw a good spark gradually deteriorate, it leads to the supposition—a supposition which gradually becomes a reality—that they will fail at the very moment when they are most needed; and as a result, especially where public halls are to be lighted, their parts must be cleansed or renewed. This is at once a nuisance and an expense, and many have heretofore deprived themselves of the advantages of electric gas lighting to save themselves this.

It is the same in the service of dwelling-houses—an immense field for the open circuit battery. Better the old style of bell pulls and even knockers, than that the bell should, without any warning, give out and refuse to answer the press of the button until the company have been notified.

THE NEW "LAW PRISM" BATTERY. (SIZE OVER ALL, 4½x4½x7½.)



The jovial burglar, too, if he is in luck, and comes when the battery is "out of order," may wantonly open windows and doors and "burgle" to his heart's content for the warning voice of the "alarm" will be stilled, and it were as easy to send for a policeman as for a man to attend to the battery.

By the use of the new "Law" battery all these and other evils may be avoided, for, as said before, it neither deteriorates nor "gives out," and may, therefore, be justly set down as efficient and reliable.

Electric Manufacturing and Miscellaneous Stock Exchange.

THE COMING STOCK AND PETROLEUM BOARD, RAPID INCREASE OF MEMBERSHIP.

"There is nothing that succeeds like success." So it is with the Electric, Manufacturing and Miscellaneous Stock Exchange, for while the membership of the Mining and Petroleum Exchanges are on the wane, theirs are constantly growing in favor, as proved by the large number of applicants for the new offer of memberships at $25.

A large number of the members of the older exchanges have made application for memberships the past week, and it has now begun to be generally appreciated that the Miscellaneous Stock and Petroleum Exchange, (the name the exchange will be known by) will afford equal facilities to the older exchanges, and that its memberships will become equally as valuable, with a cost of only $25, against an outlay from $300 to $500, and an additional cost of from $100 to $200 a year in the shape of dues and assessments, to belong to other exchanges.

The Electric, Manufacturing and Miscellaneous Stock Exchange has a sound foundation and broad basis; it is at present the proper place to find out the market for all classes of Miscellaneous Securities: Gas, Bank, Telegraph, Telephone, Railroad, Street Car, Manufacturing and Trust Companies, stocks and bonds; it is from where the Miscellaneous Security Report (Investors' Guide) secures the greater portion of its quotations.

During the coming month as soon as petroleum is listed, the board may be expected to be as active as its rivals.

For a time it was feared that owing to the cheapness of the memberships that undesirable parties would be enabled to secure admittance, but this has not been the case, as only desirable representative men have been passed by the Admission Committee, and the high standing of the membership will be maintained.

The following gentlemen have been elected members the past week:

F. H. Fast, Daniel D. Whitney, C. R Callahan, Victor A. Ligier, E. L. Fish, Geo. H. Wipple, Arthur T. Vyee, F. A. Phillips, D. M. Bedell, Daniel M. Fulenwider, M. J. Collum, Oscar J. Purdy, Calvin A. Haynes, Chas. W. Hanson, Simon Rothschild, John B. T. Bliven, E. M. Brewster, Chester Bushnell, Edward Ferrero, T. A. Stephenson, S S. Simpson, Geo. B. Post, W. B. Fo-dick, Frank Mair, Charles Reynaud and M. Finn.

The Admission Committee meet every Monday at 3 o'clock, and there are about eighty more applications for the new memberships, which will be acted upon at an early date

The books will not be likely to close before the last of December, for the first allotment of $25 memberships; when these are all taken, the next allotment, of 100, will be offered at $50.

—— Experiments have been made at the Theater Royal of Munich, in order to determine the elevation of temperature and the amount of carbonic acid under illumination by gas and by the electric light. Before the play, at the time of the experiments, when there were no more than ten or fifteen persons in the building, the curtain was raised and all the lamps were allowed to burn for an hour. The temperature was observed, at intervals of five minutes, simultaneously in the parquet, in the balcony, and in the third gallery. During the plays, when there were on an average between 500 and 600 persons in the theater, the thermometer was observed every ten minutes. The experiments showed that the electric light greatly diminishes the increase of temperature. It does not render ventilation superfluous, but it requires a less active ventilation than gas, since it does not, like gas, contribute to the carbonic acid and to the increase of heat.

Electric Railroading

A COMMISSION TO PICK OUT THE BEST FEATURES OF THE FIVE COMPETING MOTORS AND MAKE PRACTICAL TESTS—A NEW COMPANY TO BE FORMED.

A meeting of gentlemen interested in electric motors was held last week at the house of E. N. Dickerson, 64 East Thirty-fourth Street, with the purpose of consolidating, if possible, under one company, all the best features of the various systems, thus securing a prompt application of electricity to the railroads of the world. Among those present were Cyrus W. Field, David Dudley Field, Dr Henry M. Field, Col. Hain, general manager of the Manhattan Railway Company; Stephen D. Field, electrician; the Messrs. Hawkesworth, representing the Daft electric motor; Mr. Coster representing Drexel, Morgan & Co. and the Edison patents; Charles Hoeltner, representing the Siemens patent; E. N. Dickerson, Sr., and E. N. Dickerson, Jr.

The meeting was the culmination of a series of meetings and negotiations looking to this object. Mr. Cyrus W. Field, in particular, has been an enthusiastic advocate of the application of the electric motor to the elevated railways, and has been for some time urging experiments upon the directors of the elevated railway companies. The great stumbling block hitherto has been the competitions and rivalries of the various motor companies.

The meeting resulted in the substantial adoption of a plan which, it is believed, will secure the very best possible electric motor within a very brief period. The plan adopted is that the owners of the Edison motor, the Field motor, the Daft motor, the Siemens motor and the Brush motor shall submit their inventions to the judgment of a practical commission, consisting of Sir Wm. Thomson, of Glasgow University; George B. Roberts, president of the Pennsylvania Railroad; J. H. Rutter, president of the New York Central and Hudson River Railroad; Robert Harris, president of the Northern Pacific Railroad, and Charles R. Cross, professor of physics in the Massachusetts Institute of Technology.

A company is to be formed with a capital stock of $1,000,000. Half a million dollars is to be paid in in cash. The five motors are considered to be worth the other half million, and their owners will receive that amount in stock of the company in the proportion determined by the commission, which has absolute power to make a final decision. The commission may award the entire half million to one invention if it sees fit.

As the apparatus and patents of all the motors become the absolute property of the new company, the result will be to make a motor combining all the advantages of all the motors now known to be of any value. The gentlemen interested are sanguine that before long they will be able to produce an electric motor that shall be applicable not only to elevated railways, but to all surface railways, including horse, locomotive and cable roads.

The gentlemen of the commission are in a position to give all the motors a thorough test at once on all sorts of lines, with heavy grades, sharp curves, big loads, and straight, level tracks. It is expected that their report will be ready within ninety days at the farthest.

Electrical Review.

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We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

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Messrs. Wm. Dawson & Sons, 121 Cannon Street, London, England, are our representatives for Great Britain.

NEW YORK, DECEMBER 6, 1884.

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It is proposed to extend the time when telegraph and telephone wires in Philadelphia must be laid under ground till a year later than the recent law requires. The city solicitor has prepared an ordinance fixing January 1, 1886, as the limit; and this is to be presented to the city council at the next meeting.

It is said that the electric light has been found to be cheaper than candles in the illumination of British ships of war. No one who has not had experience on board the ponderous ironclads can realize the miserable condition of life below decks without the bright illumination of the electric light. Besides, most of the ironclads swarm with rats, and the electric light will do something to dispel them.

It is claimed, as a result of the recent decision of the United States Supreme Court that an appeal cannot be taken from the decision of the Commissioner of Patents to the Secretary of the Interior, Secretary Teller has ordered the dismissal of all pending appeals in patent cases. In the cases (and included, there is an appeal relating to the telephonic interference proceedings between Blake, Edison, and Drawbaugh), it is believed that the secretary's decision will be without legal effect, and the parties in interest must revert to the original decisions of the Commissioner of Patents.

JUSTICE AT LAST.

After long and weary waiting, after four years of contest, and an expenditure of money which would have ruined most litigants, a decree has been ordered for the Bell Telephone Company in its suit against the Peoples' Telephone Company, representing the alleged inventions of Drawbaugh, and the injunction against the Peoples' Company is now made perpetual, with the right of appeal, of course, to the Supreme Court, which will doubtless be taken. But for all practical purposes in the near future, the decision is final, since it will take a number of years for the Supreme Court to reach the case, and in the mean time the defendants are powerless.

As yet we have not seen the full text of the decision, but enough of it has, at the present writing, been made public to show that the Judge, in a large measure, bases his opinion upon the inherent improbability of the rightfulness of the claims of Drawbaugh, who, according to his own story, calmly stood by after he had made these important and well-nigh invaluable inventions, and, without a word of protest, permitted another to reap the glory and the reward. This the Judge considers fatal, despite the great mass of evidence adduced in support of the Drawbaugh claims.

We have more than once, while this important suit has been pending, expressed our dislike and disapproval of "trial by newspaper," and certainly, now that the appointed tribunal has rendered a learned and exhaustive decision, any judgment that we or any other newspaper might render would be highly unimportant and unnecessary. But we may be permitted to say, now that the case is settled, and an award has been made, that we have steadily been of the opinion that the Drawbaugh claims were founded upon a conspiracy to rob men of their just rights under the patent laws. We are very far from expressing the opinion that all or any considerable number of those who have been prominently connected with the enterprise were either cognizant of or parties to the conspiracy. On the contrary we are firmly convinced that it was part of the scheme to get honorable and innocent men honestly interested, so as to give character and respectability to an enterprise which had none of its own. And we further believe, now that the case has been decided in favor of the Bell Company, that the conspiracy, no longer held together by the cohesive power of prospective plunder, will fall to pieces, and that we shall yet see the inside of one of the greatest pieces of rascality ever concocted, to the disgrace of the few who devised it, and the chagrin and mortification of very many more who were honestly misled into believing the story to be genuine and staking their money on the result.

Believing this, and feeling that nothing more than exact justice has been done—and who, having read even a synopsis of the evidence could doubt what the result would be—we feel like offering our congratulations to the Bell Company, and to all who, directly and indirectly, will be benefited by the fact that an end has come to the long suspense. The sub-companies, operating under licenses from the parent company, will take new courage, their work will be extended and enlarged, the number of outstanding telephones will increase, and the whole industry will take a new start.

Of all the men who will receive congratulations, no one deserves them more than Mr. Storrow, now taking a well-earned rest in Europe. We venture to say that, for sustained effort, for intimate knowledge of the subject in hand, for exact accuracy in the plain, straightforward recital of facts, their bearing upon one another, and the deductions to be drawn from them, his argument stands alone in the long list of pleas that have been made before the United States Court in patent causes. It was the justice of the company's cause which won the case, but it was the way in which it was put by Mr. Storrow that made its justice apparent.

EDITORIAL NOTES FROM BOSTON.

Among electrical people in this city there is just now a good deal of interest in the work which the Western Union is doing in laying its wires underground between its office on State Street and the several railway stations on Causeway Street. These wires are to take the place of those now suspended on a very objectionable line of poles on Elm and Friend Streets. These streets are exceedingly narrow, and the sidewalks are not more than half wide enough to accommodate the ordinary travel, as they are the frequented thoroughfares from the railway stations mentioned to the business centers of the city. These "poles"—they are really masts—are set on these sidewalks, and form a very serious obstruction. Moreover they were set in a half clandestine way, the work being done one Sunday last summer, and pedestrians who saw a clear street the Saturday before found it obstructed by this line of tall masts on the following Monday morning. Of course, there was a howl of indignation, the insurance people were stirred up, the courts were appealed to, and the result was that the Western Union got a peremptory order to remove its poles and wires from the streets named. It has, therefore, dug a trench, has put in two iron pipes of about three inches each in diameter, and into these it has, during the past week, been engaged in drawing insulated wires. It is said that the job, which would not have been necessary had the representatives of the company exercised a little common sense in selecting a route for their wires, is to cost something over $20,000.

Report has it that it is now the policy of the Western Union to bury pretty much all its wires in cities, and to do away with branch offices, except such as can easily be reached without either going overhead or too much expense for reaching by means of buried wires. It has entered into a contract for a large amount of underground cable with a prominent manufacturing company in England, and it is for this underground work in cities that this cable is intended. It is further said that it is doing this partly because itfeels that the time is coming when it will be compelled to do so, and partly—the Western Union is very human—because it expects, by taking the lead, to embarrass its weaker competitors by forcing them to follow suit or go out of business.

General Eckert, general manager of the Western Union, was over here last week, I am told, although I did not see him, and therefore cannot vouch for the fact. I wonder if it occurred to him to look into the little dark "pen" in the Post-Office building, which is the principal "up-town" office of the great Western Union. If so, he must certainly have blushed for his company. It is the most narrow, contracted, dismal, out-of-the-way hole that one can well imagine, with absolutely no accommodations for the public. It may be that this is the best that Postmaster Tobey can afford in the building, considering its very crowded condition, but certainly the patrons of the telegraph company deserve better treatment at its hands, and, if proper quarters cannot be had inside the building, it would be better to secure something adquate somewhere in the vicinity. Fortunately for the public, the offices of the Bankers and Merchants' and of the Baltimore and Ohio are near at hand, and so, too, is that of the Mutual Union, which is taking business at "away down" rates. The Baltimore and Ohio has a well-located and well-equipped though modest office, while the Bankers and Merchants' is in the palatial quarters formerly occupied by the Eliot National Bank, not only the business office, but the operating room as well being on the ground floor. It would be far better for the Western Union if it had its building in this section, in the near vicinity of all the newspapers, and at what is certain to be the city's chief trade center. There was a time when no self-respecting bank, banking firm or broker thought of having an office off of State Street, but all that is changed now, and the course of banking and financial institutions in this city is distinctly southwest toward the Post-Office.

The Boston Telephone Exchange is still in the old building, 40 Pearl Street, and will not be removed until the new boards, now on their way from Chicago, are set up in the new building, into which the executive and business offices of the company have already been moved. The new boards, which are almost identical with those shown by the Western Electric at the Philadelphia Exhibition, are very elegant pieces of furniture, and the room into which they are to be put is in every way worthy of them—high, well-lighted, and generally attractive. In the afternoon and evening it will be lighted by incandescent lights furnished by the Weston Company, and there is no reason why it should not be, and be kept as, neat and attractive as any parlor. I can say for the Boston operators that they are unusually quiet about their work, and that the casual visitor gets less indications of what is going on than in any exchange I have yet visited. The young ladies seem to appreciate the value of a "still, small voice" in telephony, and put their theory into practice.

It is the intention of the management to run no single wires from the exchange, but to radiate in the several directions by means of cables of varying lengths, according to circumstances, and then distribute from the further ends of these. The greater part of these cables will be overhead, but some will be underground in conduits already constructed and in use. There is a "well hole" in the building for bringing these underground cables up to the floor upon which the exchange is located, and care has been taken to make it large enough to bring up enough cables for the full capacity of the exchange, in case all the wires should go underground some day.

The Oram time regulator, described and illustrated in the REVIEW last summer, is in operation in connection with the Boston exchange, and is giving excellent satisfaction. Up to the present time subscribers generally have not exactly understood it, nor has much pains been taken to bring it to their attention, because the company's electricians have been experimenting with it. But at last a contract has been entered into between the New England Company and the Time Company; it has been decided that the "regulator" has "come to stay," and, no doubt, means will be devised for informing subscribers that they can ascertain the hour and minute at any time by holding the hand telephone to their ear for a few moments.

I have had occasion to talk with persons in towns twenty and thirty miles from this city several times recently, and have been surprised to find how poor the service is. The fault is laid at the door of "induction," which has to bear a great many sins of the electrical sort, and, no doubt, with very good reason. Listen on a wire between here and Providence, and it sounds as if you had your ear at a speaking tube which opened into a room full of buzz saws in active operation. But I have tried it in the dead of night, and likewise on Sundays, and, although the buzzing was absent, the service was poor. Personally, I have great confidence in soldered joints on telephone lines, and, unless I am much mistaken, they are far less frequent hereabouts than one might reasonably wish.

We have got pretty well along into the short days, and the time for an active demand for electric lights has come. The chief thoroughfares are brilliant with them, and many business establishments are using them extensively for interior illumination. There are three companies here—the Brush, Weston, and Merchants (Thomson-Houston)—each furnishing a large number. The aggregate just now cannot be less than sixteen hundred in the whole city, and the demand is still for more. Notwithstanding all that has been said against the arc light, despite all the inspired tirades against it which have found place in the columns of the daily press here

despite the efforts of the gas company in sundry ways and at all times to throw discredit upon it, it has constantly and steadily grown in public favor, and I believe that if the question of lighting the streets by arc lights only, and excluding gas altogether, even at an increased expense, were submitted to the people, the decision would be in favor of arc lights by a large majority. It is interesting to see that the daily papers here have far less to say about electric lights, and the dangers and difficulties that environ them, than formerly. Metaphorically speaking, every time they opened their mouths on the subject they put their foot in it, and they have become a little careful. The average Boston editor—I know him intimately, and, personally, is a very good fellow, intelligent, well informed, and square, meaning to do the fair thing by everybody and to do injustice to no one; but if there is one subject upon which he is wholly and absurdly at sea, it is electricity, its characteristics, possibilities, and limitations. This ignorance he is not to be blamed for, but it is a matter for a good deal of congratulation that he at last realizes it.

The Weston Company has placed four of its large incandescent lights—125 candle-power each—in the well-known book store of Messrs. Clarke & Carruth, on Washington Street, where they are attracting much attention and giving excellent satisfaction. These were shown at the Philadelphia Exhibition, and were described at some length in my "Notes;" but the exhibition was a poor place to judge of them, because the whole place was so flooded with light that it was impossible to see how much illumination was due to them. But in the store in question they are the only lights used, and it is really startling to see how brilliant the illumination is. The charge fifty cents a night for each—seems to me a trifle high, considering that two of them can be run with a little less power than is required for one arc lamp, and that the price of these, which require daily attendance and new carbons, is but ninety cents. Still, considering the steadiness of the light, its novelty, and general attractiveness, I think the company will have no trouble in placing a large number of these lights even at the figure quoted, especially at this season, when the days are short and people are already beginning to throng the stores in search of holiday gifts.

The startling thing in electrical circles here this week has been the decision in the Bell-Drawbaugh case. The Bell people were confident of a decision in their favor, but when it would come no one could tell. On Friday and Saturday of last week it was "in the air" that the crisis was at hand, and Bell stock walked up to two hundred and twenty. I talked on Saturday evening with gentlemen who were in a position to know, and they assured me that there was nothing definite known as to the time when the decision would be rendered. On Monday morning the stock was sluggish at 215, but, after the first board the tidings were wired over, and in the afternoon the stock opened at 265, and went up later ten points more. Of course the Bell people felt good, and there was a good deal of mutual congratulations at No. 95 Milk Street. It is not unfrequent, it seems, for decisions to be rendered in print, so that it is easy to get duplicates, but in this case the Judge, determined to avoid all possibility of its getting out prematurely, sent the Clerk of the Court but one copy, and that in type-writer print. There was some lively copying done in the Clerk's office in New York on Monday and on Tuesday morning the executive officers and directors of the Bell Telephone Company had a joyous session, reading it over together.

Of course it lays the Drawbaugh folks out cold. They were under a temporary injunction before, and now it is made perpetual, that is, unless the decision is reversed by the Supreme Court. This is far from probable, but, were it so, it will take years before the Supreme Court can get at it, and in the meantime the Bell Company holds the field, and will be daily strengthening itself. This decision is going to give confidence to every sub-company, stiffen up the market value of its stock, and encourage it to go into new work. It is going to dampen the ardor and courage of every one of the companies whose telephones are alleged infringements of the Bell patents, and it is going to encourage the Bell people to prosecute their suits against them with renewed vigor. Its effects will be widespread, for every manufacturing company which makes and deals in telephone supplies is going to find an increased demand for its goods. There are, in the hands of a number of these sub-companies, blocks of stock known as "Treasury" stock, which has long been unavailable, because the market was too low to permit of its being sold. The "boom" will lift this, in the case of well-established companies doing a good business, to the point where it can be marketed, furnishing the means wherewith to build new lines and establish and equip new exchanges.

Nor must I forget "the boys." There is no body of men among whom exists a stronger "*esprit de corps*" than among the telephone men. They have been a little too sanguine sometimes, but they have had honest convictions as to the value of the business with which they are connected, and they have had the courage of their convictions, as evidenced by the fact that there but few of them who have not held, on their private account, more or less telephone stock of one kind or another. The past few months have been very trying for them, and many a poor fellow who fondly hoped that his little block of stock was going to be the foundation of a competence, has seen the time when it was a mill-stone about his neck, making it hard to go through from month to month, and make both ends meet. A ray of very bright sunshine has come into their lives, things look very different to them, and more than one of them will have a merrier Christmas than if Judge Wallace had delayed his decision another month. A joyous time to them!

Of course the Drawbaugh people here don't feel so happy, although they bear up nobly. One of them, being commiserated upon the fact that he had lost the case, said that he was in the position of the noted lawyer who said: "I never lose a case, *but my clients sometimes do.*" It is a trifle hard on the "clients," especially those who subscribed for the stock of companies which were to be sub-companies of the "Peoples," and to work, under license, the instruments alleged to have been invented by Drawbaugh. The stock was put out to them at $15 a share (par 100), one half to be paid in cash, and the other half when the alleged claims of Drawbaugh were established. This always reminded me of the Confederate treasury notes, "payable two years after the ratification of a treaty of peace between the Confederate States and the United States of America." Peace came, but without the formality of a treaty, and in coming it wiped out the Confederate States absolutely, so that the notes were not worth the paper they were printed upon, except as curiosities. I fancy that the Drawbaugh certificates have just about that value to-day.

At the Mechanic Charitable Building work is at last progressing with some degree of vigor for the opening of the American Electrical Exhibition. It was hoped that all would be ready last Monday, and the managers had reasonable grounds for thinking so, inasmuch as the exhibitors had definitely promised to be prompt. But they lagged, and a postponement had to be announced. It looks now as though things might be fairly ready by next Monday, but not before. The Bell people have commissioned Mr. Gilliland to make their exhibit, and it is sure to be a very interesting one. He is also to have charge of Mr. Edison's private exhibit, and I understand that the Western Electric will show side-by side with the Bell people, as they did at Philadelphia. The Bedwell electric railway, also shown on a small scale in Philadelphia, is to make a really important exhibit, and I see that the Rhode Island Electric Company is putting up a number of clocks in different parts of the building. It must be remembered that it was fully two weeks after the Philadelphia show opened before it was really ready, and some leniency ought to be shown managers for the delay here. They are the greatest sufferers by it, and they are in no way responsible for it.

The Electrical Development and Manufacturing Company is getting into first-rate shape, and is hard at work on orders. It has patented, and is now manufacturing, a new cut-out box for arc lights, by all odds the best thing of the kind that I have yet seen. Its action is certain, perfect contact is assured, it cannot by any possible accident be left "half-way over," and it is much cheaper than the forms of cut-out box now used for the same purpose. The company has also devised a new call-box for district telegraph use, and is manufacturing a large number for the Baltimore and Ohio Telegraph Company. It has fine quarters at 197 Congress Street, occupying two entire floors with its workshops and laboratories, and part of a third with its offices and store rooms. Its offices have this week been supplied with the Thomson-Houston incandescent light. As yet they are working only fairly well, but as they have been in but a few days, and are on trial, it is hardly fair to speak of them or the light which they give. They are run from arc currents, a distributing box, which divides the current up into nine parts, furnishing nine incandescents, taking the place and power of an arc light. Of course, when any single light out of the group of nine is not wanted, its part of the current is automatically shunted into a resistance coil, which takes it up, so that there is no economy unless the whole group of nine are put out.

They tell me that the Royal Electric Co., in Montreal, has made a storage battery of its own, from which it is getting from thirty to forty very good lights. The battery is still in the experimental stage, and how long it will last time only can determine. I am in hopes to get further data concerning it at an early day.

Word comes to me that negociations are about closed between the Rhode Island Telephone Company and the Oram time people; also that the Southern New England Company is likely to adopt and use Mr. Oram's time regulator.

New England Telephone stock jumped up to 42 on the receipt of Judge Wallace's decision. Erie, which has been hanging around 20, did not take a start, but remains at about the same old figures. I don't want to write any more "Chapters of Erie," but there is material enough, should occasion seem to require.

The American Electric and Illuminating Company is pushing things with vigor. Mr. W. H. Burgett, the new general manager of the company, has just returned from Port Huron, Mich., where he has closed a contract for a plant of one hundred lights. A contract has also been closed for a one hundred light plant in Bangor, Maine, and work will be begun upon it immediately. The American Company was never stronger, busier or in better shape than now.

THE "DAKOTA DEAL."

(Editorial Correspondence of the ELECTRICAL REVIEW.)

BOSTON, Dec. 3, 1884.

I had a pleasant call to-day from Mr. Chas. E. Adams, who took exceptions to the statement in my Minneapolis letter to the effect "the whole matter of the purchase price (of the South Eastern Dakota franchise) had been passed upon and approved by them (Messrs. Adams and Jewett) as directors." He showed me that he was not chosen a director until December 5, 1883, and also that the Dakota purchase was made in the preceding July, so that he could not, as a director, have been a party to it. On consulting the records, I find his statement as to dates exactly correct, but I also find that, on the 11th day of December, 1883, six days after his election as a director of Erie, there was a meeting of the Board, at which were present Messrs. Ingham, Glidden, *Adams*, Coburn and Jewett. At this meeting the appointment of an auditing committee, consisting of Messrs. Jewett, Pollard and Shattuck, previously made by the Executive Committee, was approved and ratified by the Board, and subsequently, *but at the same meeting*, Mr. Adams being present, the report of said auditing committee, covering, among other transactions, the Dakota purchase, was received and accepted.

I certainly had no desire to do Mr. Adams an injustice. Considering all the facts, I do not feel that I did. WM. A. HOVEY.

DETROIT IRON TOWER COMPANY.
DETROIT, MICH., Nov. 17, 1884.

Editors of the Electrical Review:

GENTLEMEN:—We have been doing a very extensive job in tower building in Detroit this season having erected 80 towers in this city since last June. The largest portion of these towers are 150 feet in height, the highest being 175 feet. The total number of arc lamps (2,000 candle power) is 340 in use on towers. Detroit enjoys the distinction of being the only large city in the world which is lit entirely by the tower system, and we can assure you that the system is rapidly growing in favor with the people of Detroit. It has been opposed most bitterly by a portion of the local press and people, and some of our citizens who have the habit of forming their own opinions, uninfluenced by these journals, have been so unkind as to intimate that the *inspir tion* of this adverse criticism was caused by the stockholders of the gas companies.

Of course in the execution of a work of this magnitude there have been some imperfections, but these are being rapidly corrected, and the tide of public opinion is rapidly setting in our favor. If your editor is still in the West, we think it would be well for him to take in Detroit on his return trip, so that he can judge for himself whether the tower system is "a failure," or a success. We take our stand upon this platform. "The tower system is a success, and is the only means by which a city can be properly lighted by electricity at a cost less than gas light." And upon this platform we expect to win, and not be "counted out."

Respectfully yours,
DETROIT IRON TOWER COMPANY.

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* * A recent writer in a British review claims that a decade constitutes a trade cycle, and states that an examination into the commercial history of Great Britain for nearly 70 years past verifies this theory. The year 1816 in England witnessed a commercial crisis followed by three years of depression. A moderate recovery in 1820 was succeeded by three years of overtrading, and another commercial crisis in 1826. A similar cycle of depression followed by recovery, and subsequent excessive speculation next came, ended by a breakdown in in 1837. In short, the years 1816, 1826, 1837, 1847, 1857, 1867 and 1876 witnessed commercial crises in England; while 1820, 1830, 1840, 1850, 1860, 1870 and 1879 saw the inauguration of a period of moderate recovery, followed by an era of speculation, which was usually of three years' duration, and rounded by a panic. On this side of the water we find this rule holds nearly true, though the rebellion broke up the regularity in the succession. Since the war, panics have occurred in the Fall of 1873 and in the spring of 1884, about 10½ years apart. That these 10-year cycles are further divided into three periods—one of depression, one of moderate trading, and one of excessive speculation is easy to see, and we find a belief in these subdivisions of three years (or a third of a decade) to be prevalent in nearly all branches of trade. Following this theory, brings us to better times in 1887, and to the maniacal speculation period again in 1890. In view of the tendency of the age to "hurry," we trust that the good time coming will increase its speed as it draws near.

Telephonic News

*** E. T. Baker, Esq., has been appointed assistant general manager of the Cumberland telephone Co. at Nashville, Tenn.

*** Professor Riatti has devised a new battery, based on the production of electric current through the difference of temperature of two states of one and the same substance. Two copper pipes, fixed a slight distance apart, pass through the wooden or porcelain cell, containing a solution of sulphate of copper, and are traversed, the upper one by steam and the lower one by cold water. When the circuit is closed, the copper of one pipe becomes dissolved and deposited on the other.

*** The Inter-Continental Telephone Company, operating under exclusive government concession in Venezuela, now has exchanges established at Caracas, Da Guayra, Valencia, and Porto Cabello, aggregating nearly 500 subscribers. It has trunk lines connecting Caracas and Da Guayra, Valencia and Porto Cabello, over which a very large business is done. The exchanges are remitting surplus receipts to the Boston office already, and the net earnings in 1885 will exceed 10 per cent on the entire capital of the company.

*** The Domingo Electric Company have secured valuable concessions from the government of that country, and are about to proceed vigorously in the establishment of exchanges and the building of connecting lines. No iron or galvanized wire of any description is to enter into the construction, it having been decided to use copper wire exclusively. Not only is this the case, but not even a screw or rivet will be used in outside work which is not made of copper. The Palmer Wire Company is supplying the copper wire to be used by this company.

*** Judge Wallace of the United States Circuit Court, on Monday morning last handed in his decision in the case of the American Bell Telephone Company against the People's Telephone Company. The desicion is voluminous, covering many pages of legal cap, and is in favor of the complainants, the American Bell Telephone Company. This termination of a suit which has occupied more than four years in trials in various courts sustains the preliminary injunction against the People's Telephone Company, obtained some two years ago, and makes the Bell Telephone Company secure in all its rights.

*** The case of the Domestic Telegraph and Telephone Company and the New Jersey and New York (or Metropolitan) Telephone Company, was taken before the Court of Errors and Appeals on the 19th, and the court granted a stay of proceedings until the end of the next term. When the Vice-Chancellor a few days ago dismissed the order to show cause, and thereby enabled the Metropolitan Company to proceed with its work of establishing a competitive line, the Domestic Company's counsel, Messrs. McCarter, Hubbell and Young, immediately applied to the Court of Errors and Appeals for a hearing on appeal. The preliminary argument took place on the 19th inst., and the court granted a stay of proceedings, putting down the case for argument next term.

*** The Syndics of Rome and Naples have addressed letters to the president of the Italian General Telephone Company, warmly thanking him for gratuitously establishing telephonic communication between the various hospitals and cholera refuges, by means of which, in a great measure, the spread of the disorder was considerably circumscribed. The president, Commendatore D. Galloti, in replying, pays a high tribute to Signor Ernesto di Maria, technical director of the central office, who was urged to use the utmost dispatch in placing a telephone instrument at Pendino for the Relief Committee. He succeeded in effecting communication, but could not himself reply to a message, having fallen a victim to the cholera in the discharge of his duty.

*** At Ottawa, Ontario, on the 24th inst., the case of the Toronto Telephone Manufacturing Company against the Bell Telephone Company came up for hearing before the Minister of Agriculture. This is the case in which the Toronto Company has applied to the Dominion Government to set aside the Bell telephone patent and declare it void for an infraction of the Patent Law. Every effort has been made by defendants to procure a writ preventing the Minister of Agriculture from hearing the case, on the grounds that it was *ultra vires* of the Dominion Constitution. They failed, and the case went on. In opening, counsel for the prosecution brought documentary evidence to show that a larger number of telephones and essential component parts of the Bell telephone had been imported into Canada after the expiration of a year, as prescribed by statute, that after the expiration of two years the manufacturing of different parts of the instruments was carried on in the United States, these parts being imported and put together in Canada, in contravention of the Patent Act, and that the Bell Telephone Company had refused to sell their instruments at any price. It was found, however, that several important witnesses had been unable to reach the city, and as the Minister of Agriculture desired to obtain all possible evidence, he decided to adjourn the hearing until Tuesday, Dec. 2.

Popularity of the Telephone in Mexico.

A foreigner, coming to Mexico for the first time, with his preconceived ideas of the backwardness of this country in all modern improvements and a feeling that he must put up with the absence of a great many conveniences and labor and time-saving appliances, which he has grown to consider as almost indispensable in business in his own country, is sure to receive a pleasant surprise on his arrival here. The progress made in railroad building is well known all over the world, but the readiness with which the lately invented electrical improvements have been adopted here, so that they are really more popular than in many of the countries of the Old World, is not so well known. Mexico possesses an extensive network of telegraph lines, which are constantly being extended, some in connection with the railroads and others where railroads have not yet penetrated.

The electric light is now in general use for street lighting, not only in the capital but also in quite a number of interior cities. But the most notable progress, considering the short time since its introduction, and that only a few years ago it was looked upon as a plaything and an experiment even in the United States and Europe, has been attained by the telephone, as a comparison of the number of subscribers in this city with those of some European cities of nearly the same poulation will show. In making comparisons of Mexico's population with that of other cities, especially in Europe, the great number of poor and homeless Indian inhabitants must be taken into account, making the actual number to be considered in a question of this nature much smaller than the census would show.

The following table of cities in France and Belgium with their approximate population and number of telephone subscribers, according to the latest statistics at our command, shows a general inferiority to the use of the telephone in the City of Mexico, which with a population ranging from 250,000 to 300,000, including the large Indian percentage, numbered 560 subscribers to the Mexican Telephone Company on the 1st of November:

	Population.	Subscribers.
Bordeaux	216,000	522
Lyons	343.000	563
Marseilles	319,000	350
Nantes	122,000	92
Lille	163,000	146
Rouen	105 000	96
Havre	92,000	198
Brussels	385,000	631
Ghent	131,000	318

The above figures represent the number of subscribers on Sept. 4th, except in the case of Brussels and Ghent, which give the number as existing July 31st, 1884. The increase in subscribers in this city since April 1st, 1884, is still more remarkable, the number having been on that date 376, against 560 on Nov. 1st., an increase of 184, or 49 per cent. in seven months. In none of the cities above mentioned has the increase in the use of the telephone approached this figure, the nearest being Brussels, which gained 75 subscribers in six months.

We were led to make the foregoing comparison from the importance which we attach to the ready adoption of new inventions and improvements as a sign of a desire for every possible means of progress on the part of a people. There is no stronger proof of the adaptability of a country to worthy and promising enterprises than statistics of the nature we have just mentioned.

For an enterprise so young as the Mexican Telephone Company, the success which it has attained in its three years of existence, and especially during the last six months, promises well for the future, and it is to be hoped that it will continue to receive such a cordial support as will enable its extension in various directions, which will be of direct benefit to the public. The Villa of Guadalupe will soon be connected with this city and a number of subscribers are already assured there, so that the line will immediately pay running expenses, and yield a moderate profit. In Guadalajara, the company has 158 subscribers.

The telephone, which is at first looked upon as a luxury by those who have been accustomed to get along without its help, soon grows to be more and more of a necessity and, in fact, becomes almost indispensable to the business man in his house and at his office. This explains its growing popularity and the constant increase in its use in all parts of the world where it has been introduced. It has probably attained its greatest success in the busy, thriving cities of the United States, but the indications are that the appreciation in which its benefits are held here insures a steady progress which will be in exact proportion to the growth of business in general.—*Mexican Financier.*

Underground Telephone Wires.

ARGUMENTS FOR AND AGAINST UNDERGROUND TELEGRAPHY—ADDRESS BEFORE THE SOCIETY OF ARTS.

The following is an abstract of a paper which Mr. W. W. Jacques, electrician of the American Bell Telephone Company, read before the Society of Arts at the Massachusetts Institute of Technology on Thursday evening of last week:

The idea of laying telegraph wires under ground is not new. The first telegraph line constructed in this country, from Baltimore to Washington, in 1843, was intended to be laid under ground, and the first nine miles was so laid. Four copper wires were each wound with cotton, soaked in shellac, and the whole drawn into a lead tube. This tube was laid in a trench by the side of the railroad. Hardly was the section completed, however, when water found its way into the joints, destroying the insulation, and the conductors failed. They were accordingly replaced by wires strung on poles, and the rest of the line was constructed in this way.

In England a very similar line was built, along the line of the Great Western Railway, for a distance of thirteen miles out from the city of London. This line failed in exactly the same way as the American lines, and the pipes were dug up and placed on short posts six inches above the ground. They were, however, soon replaced by pole lines.

FURTHER FAILURES.

At various places on the Continent similar experiments were tried, and everywhere with the same results. Thus it happened that, though the first idea of telegraph engineers the world over was to run electric wires under ground, they were everywhere obliged to string the wires on poles. In England and on the Continent there has always been a strong desire to have a part, at least, of the electric wires under ground. In the cities, pole lines have been considered objectionable, because they disfigure the streets. Between cities, underground lines have been desired, because of their safety in case of invasion, great secrecy, and reliability in case of storms.

The introduction of gutta percha, in 1846, accordingly gave a new impetus to underground construction, and though it took years of experimenting and millions of dollars, and though system after system failed in England, Germany, and the rest of Europe, there exists to-day a successful and durable system of underground telegraph wires connecting together the principal cities of the German Empire—a somewhat similar system connecting together the principal cities of France—besides many other underground lines in various parts of Europe. Many of the European cities have the telegraph lines carried from the center of the city to the outskirts, under ground; and, in Paris, not only all of the telegraph lines, but those for electric lights, telephones, and the various other private and municipal lines, are carried in the sewers under the streets of the city.

INCREASED COST OF UNDERGROUND WIRES.

It must be remembered, however, that these various systems have cost from ten to twenty times as much as similar overhead lines. Moreover, it has been found that, for delicate and quick-working apparatus, such as automatic telegraphs, polarized relays, and, above all, the telephone, long underground lines are far less efficient than pole lines. There are two reasons, apart from the difficulty of securing good insulation, why these long underground lines are comparatively inefficient:

1. If an electric conductor be brought near to a large mass of conducting matter, as is a wire when it is taken down from a pole and buried in the earth, there appears in the current the phenomenon of *retardation*, by which each signal, instead of being sharp and distinct, is partly kept back, so that it overlaps and mingles with the next; the result is to limit the speed of working of the apparatus; or if, like the telephone, it be an apparatus in which the currents are necessarily extremely frequent, to confuse and destroy the signals altogether.

2. The second difficulty is called *induction*, and is noticed when two or more wires are run side by side and near together, as they necessarily are in an underground cable.

If the signals on one wire of such a cable be sharp and quick, they cause fac-simile signals on all of the neighboring wires, and this too, though the insulation may be absolutely perfect.

The result of this phenomenon is, that messages sent over one wire are liable to be received on all other wires, and, in the case of the telephone, this phenomenon is noticeable on cables one thousand feet long and on a cable one mile long the parties on one wire can easily understand what those on the other wires are saying.

I think these facts have sufficiently demonstrated that for long lines of telegraph, stretching from city to city, here in America, pole lines, which can be cheaply built, easily repaired, and where the wires can be removed from the retarding influence of the earth and the inductive influences on each other are decidedly superior to underground lines.

THE PROBLEM IN CITIES.

Within our large cities the problem presented is somewhat different. During the last few years the number of electric wires has rapidly increased, especially since the introduction of the telephone and electric light, and the probability is that the next few years will show a further large increase. If these wires are run on poles, they not only disfigure the streets, but seriously interfere with the operations of firemen in case of fire as we have repeatedly seen during the last few years. A cobweb of wires running over the house-tops requires the linemen to continually tramp through the houses and over the roofs, causing annoyance to the

tenants and damage to the buildings. Moreover, wires fixed to house-tops are subject to removal at the whim of the owner, and they have to be continually removed from building to building as the good-will of each owner is exhausted.

In Paris, *all* the wires are carried in the sewers under ground.

In London, the telegraph wires are carried from the central office to many of the branch offices and to the railways leading out of the city under ground.

In Vienna, Prague, Brunn, Munich, Augsburg, Nuremberg, and many other cities, the telegraph wires are carried under-ground by armored cables to the outside of the city.

In the German cities many of the telegraph wires are carried under ground from the center of the city to connect with cables running to other cities.

Telephone wires, electric-light wires, and a large majority of telegraph wires in European cities are, however, as in America, carried over house-tops or on poles.

THE PARIS SYSTEM.

The cable most generally made in Paris consists of several gutta-percha-covered wires laid into a cable covered with tarred hemp and drawn into a lead pipe; this pipe is fastened by hooks to the side-wall of the sewer. The cables are thus easy of access, and any new cables may be added as required without disturbing those already in use. The distances within this city are so short that neither induction nor retardation has to be considered in the telegraph wires. Electric-lighting wires, we have seen, are not affected. The telephone wires are in Paris protected from these evils by an extremely simple though expensive device. Instead of a single wire for each circuit, two wires twisted together are used, the current going out over one and returning over the other. Such a device is called a "metallic circuit." Any outside disturbing circuit tends to induce, in the two wires of the metallic circuit, equal and opposite currents, which neutralize and disappear. In such an arrangement, too, there is a minimum of retardation.

There are several thousand miles of wire in the sewers of Paris, and the cost of the gutta-percha-covered cables is about $140 per mile of wire, or about five times the cost of a pole line to do the same work.

While it seems impracticable to put all of the wires under ground in cities, much may be done by putting the heavier lines, when a large number of wires run side-by-side for a considerable distance, under the street.

Our American telegraph and telephone companies have recognized this fact, and I shall describe briefly some of the lines which have been constructed in this way.

EXPERIMENTS IN BOSTON.

The American Bell Telephone Company has recently constructed two short lines of underground wires in the business section of Boston, and these give us excellent data from which to judge of the extent of technical practicability and the expense of putting all wires under ground. We have seen that in Paris the retardation and induction are both obviated by the use of double and twisted wires in metallic circuit. It is necessary that *all* of the wires be in metallic circuit, for, if a metallic circuit be connected to a single-line circuit, the disturbances are not removed. If a subscriber in one city wishes to talk with a subscriber in a neighboring city, both cities must have metallic circuit systems and metallic circuits between the two cities. As the two lines constructed in Boston are short, only about one-quarter of a mile each, it was deemed best to use single-line circuits, hoping that the induction and retardation on so short lines would not be serious.

The system is constructed as follows: Eight wrought-iron pipes, three inches in diameter, are laid side by side in two rows, about four feet below the surface. At each street corner is built a brick chamber, large enough to admit a man, and with a cover flush with the street. The cables, of which several kinds are in use, run out from the basement of the central office through these pipes and up the side of buildings to roofs, from which they spread out to the subscribers by means of ordinary overhead lines.

IN OTHER AMERICAN CITIES.

In Washington and Pittsburg the telephone cables, instead of being drawn through conduits, with man-holes at intervals, are laid in wooden troughs some two feet below the surface of the street and these troughs are filled with pitch.

Of course, this system, once laid, is inaccessible.

In Chicago the Bankers and Merchants' and the Postal Telegraph companies have each constructed underground lines from the outskirts of the city, some four miles, into their respective offices near the center of the city, and, from their offices, the lines radiate so as to enter a considerable number of hotels, public buildings and important business buildings.

In both of these lines cables are drawn into iron conduits with man holes at every street corner somewhat as in the plan adapted by the American Bell Telephone Company, in Boston.

B. & O. Telegraph Company.

ANNUAL REPORT SHOWING A SATISFACTORY CONDITION AND GREAT PROGRESS.

There was much more than ordinary interest, particularly in telegraph circles, over the annual report of the Baltimore & Ohio Railroad Company submitted to the stockholders last Tuesday as it was to go into details as regards the Telegraph Company. Quite a space in the report was devoted to this subject and the opening lines indicated the spirit of the management. There was a quotation from the report of the late President to the effect that the absolute independence of the telegraph system should be maintained and such connections established as would enable it to preserve firmly and successfully its independence as a great competing organization. As thus said the father, so reiterates the son; and there was no uncertain ring in his utterances on the question. The statement was made that $2,000,000 had been expended during the fiscal year in the acquisition of lines, and that at this time the system represents 6,886 miles of poles and 47,417 miles of wire. This embraces a system double that of the Atlantic & Pacific, when in 1883 it was bought by the Western Union for $8.500,000 in stock, and one and a quarter times as large as that of the American Union, which was sold for $15,000,000, also in the same stock. At the close of the war in 1865, the wire mileage of the Western Union Telegraph Company was slightly in excess of 60,000, and the capital stock was $21,000,000. In other words, the Baltimore & Ohio system will, when lines now in course of construction are completed, be not only nearly as extensive as both the Atlantic & Pacific and American Union combined, but, as compared with the Western Union at the close of the war,

AS GREAT IN MILEAGE,

which mileage, as heretofore shown, was represented by a capital of $21,000,000. The total mileage of the United States at the close of the war could not have been in excess of 75,000, because in 1866, after the Western Union had absorbed the United States Company and American Union Telegraph Company, the total mileage was only 75,000; with no competition other than that of three comparatively local companies of insignificant mileage. The expenditure of the past year on the Baltimore & Ohio lines were made when material was at least 15 per cent below the lowest prices at which any lines were ever constructed in this country, and the system exceeds that in capacity of any other competing telegraph company, and between the two great cities of the East and West its facilities are the equal of any company. The public has already received and will continue to receive advantages and economies from the competition offered, and as every suit at law brought against the Baltimore & Ohio Telegraph Company in the attempt to retard its progress has failed in its purpose, competitive telegraphy, it is proven, can be sustained, all arguments to the contrary notwithstanding.

The stockholders, after listening to the annual report, went into an election for Board of Directors of the Baltimore & Ohio Company. The old board was, for the most part, re-elected, the main change being the election of F. Harrison Garrett in place of Robert Garrett as a director. The vote polled was the greatest known since the organization of the company, nearly $10,000,000 of the $15,000,000 of stock being represented. The new board meets on Thursday for the election of President and other officials.

.... President Norvin Green of the Western Union Telegraph Company sends out a card to the public denying that the company delayed, altered, or withheld the election returns of this State or any other State, or tampered with them in any way. It had nothing to do, he says, with the returns of this State except to transmit them as prepared by the agents of the Associated Press. The Associated Press did all the compiling in its own office, and all bulletins were prepared by it. No person connected with the Western Union, except the operators, had any access to the returns until the bulletins made up in the Associated Press office were handed to the company for public distribution. Dr. Green adds that he has no reason to believe that the agents of the Associated Press acted otherwise than impartially. As to delay, the returns never came in so promptly from so many districts. The importance of the late returns in this case made their lateness conspicuous. As to Indiana, in the absence of any agent of the Associated Press, Mr. J. F. Wallack of Western Union, at the request of the political committees and the press, sent out the returns. He says that he did his best. Dr. Green has invited the Chairman of the Democratic State Committee to assist in the investigation which Mr. Wallack has asked for.

.... The telegraph appears to have made more progress in the United States than in any other country. The number of American telegraph offices in 1882 was 12,917, and the number of telegrams forwarded during the year was 40,581,177. The number of telegraph offices in Great Britain and Ireland in 1882 was 5,747, the number of telegrams forwarded being 32,065,029. Germany had 10,803 offices, the number of telegrams forwarded being 18,362,173. France had 6,319 offices, the number of telegrams forwarded being 26,260,124. Russia had 2,819 offices, the number of telegrams forwarded being 9,800,201. Belgium had 835 offices, the number of telegrams forwarded being 4,066,843. Spain had 647 offices, the number of telegrams forwarded being 2,830,186. British India had 1,025 offices, the number of telegrams sent being 2,032,603 Switzerland had 1,160 offices, Italy 2,590, and Austria 2,696. The number of telegrams forwarded in these three last-mentioned countries was 3,046,182, 7,026,287 and 6,626,203, respectively. A contemporary supplies some interesting particulars as to the number of words transmitted by telegraph to all parts of the kingdom of Great Britain on the occasion of the Prime Minister's recent visit to Edinburgh. On the evening of Mr. Gladstone's arrival press messages containing over 17,000 words were handed in at the telegraph department of the general post office; but the actual number of words transmitted was over 67,000, owing to the fact of the same report being sent to more than one newspaper. Mr. Gladstone's visit to the Forth Bridge Works led to the transmission of 12,000 words, and his movements on the following day to 19,000. On the occasion of his first speech on Saturday evening (August 30) in the Corn Exchange, 62,471 words were handed in and 138,445 transmitted. The number would have been greater had not Sunday intervened, allowing of the transmission of many messages by train. On Monday evening, September 1, the press messages reached the enormous number of 117,000 words, causing the transmission of about 427,000 words, the largest number ever transmitted on any one night from Edinburgh. After the Waverley Market speech of Tuesday night, September 2, 172,821 words were transmitted.

TELEGRAPHIC

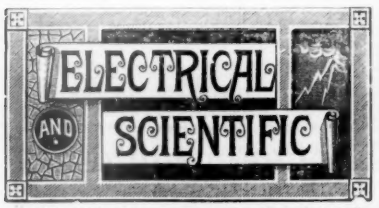
... The referee to whom was referred the suit brought by the city against the Bell Telephone Company and the Mutual Union and Western Union telegraph companies, in Philadelphia, to recover a license fee of $1 per year per pole and $2.50 per mile of wire, has filed his report. He says that the fees exacted are unreasonable and operate in substance as a tax, and he, therefore, is of opinion that their collection cannot be forced.

.... Some generally well-informed parties have been buyers of the Postal Telegraph Company first mortgage bonds. The price has advanced the past week from 29 to 31 per cent. We believe they are good for a considerable further advance. It is thought that Mr. Mackay and his associates have now such a large interest in the postal telegraph, and it is so important to the success of their Commercial Cable Company, in which they have some $4,000,000, that they intend to see the company through.

.... The chambers of commerce of London, Liverpool, Manchester, Paris and Marseilles have been exchanging communications with a view to taking joint action at the coming telegraph conference. The denials by the various telegraph companies that further restrictions of the cod fishery and other curtailment of present facilities are contemplated are distrusted by the chambers, which will ask for the admission of representation at the conference.

.... J. W. Plaisted, of Portland, superintendent of repairs of the Western Union Telegraph Company, began last week to bury all the wires leading from the Boston & Lowell, Eastern, Fitchburg and Boston & Maine Railroad stations to the main office on State street. The wires will be placed in two heavy iron tubes, three inches in diameter, laid six inches apart. They will lead into manholes five feet in diameter and about 450 feet apart. The work will be carried on night and day until done. The expense will be nearly $15,000. After this is done all of the Western Union poles and wires on Friend street, and the housetop wires, will be removed at once between the above-named points.

.... The report of the Baltimore and Ohio Telegraph Company shows that in extent of wire mileage it is twice what the Atlantic and Pacific was when purchased by the Western Union, and one and a quarter times larger than the American Union mileage when it was taken into camp by the same company. For the Atlantic and Pacific the Western Union paid, in its stock, $8,500,000, and for the American Union $15,000,000. On the Baltimore and Ohio system $2,000,000 was paid out during the year ending September 30, and the report says that, comparing the cost of the Baltimore and Ohio system with that of the system of its principal competitor, it is believed that it can obtain and hold such a volume of business as will yield very satisfactory net results from the expenditures. By the close of the year it will have a mileage nearly as great as that of the two companies combined, which cost the Western Union over $23,000,000. It will then nearly equal the whole of the Western Union mileage in 1866, after it had absorbed the United States and American companies, and be nearly as great in extent as the entire system of the country at the close of the war, when it was little, if any, in excess of 75,000 miles. No attempt has been made to force the business, owing to the fact that wires are still being strung, and it has been the desire of President Bates to move slowly, in order that satisfaction might be given the public and its wants thoroughly provided for. The Baltimore and Ohio system now embraces a wire mileage of 47,417 miles, with 6,886 miles of poles, this not including the mileage still in course of construction. Advantage has been taken of the low price of material, it being stated that the expenditure has been upon a basis of at least 15 per cent, under the figures at which any lines were ever built in this country.



* * Dr Gore, in a paper on the electrolysis of fluoride, chlorate, and perchlorate of silver, has shown that a solution of these salts is readily decomposed by using electrodes of silver and an electric current derived from a single cell composed of zinc and platinum in dilute sulphuric acid.

* * There has been cast at the foundry of The Henry Bonnard Bronze Co., 237-239 Mercer Street, this city, a bust of Col. Baines, manager of the electric exchange at Philadelphia, Pa. Prof. Rupert Schmid is the sculptor. The bust is given as a present to Col. Baines by the clerks and employes of the Electrical Exhibition.

* * The substitution of electro motors for steam engines has a sufficient basis of probability to be worthy of consideration. In view of the great amount of work accomplished by electricity during the past few years, it would be rash to assert that electricity will never be commercially available for driving machinery in the mills of Lowell or Lawrence.

* * Among the latest inventions reported from Australia is a machine for producing rain storms. It is intended to force a rain supply from the clouds during a period of drought. The apparatus is in form of a balloon, with a charge of dynamite attached underneath it. The balloon is to be sent into the clouds, and when there the dynamite is to be fired by a wire connecting it with the earth. A trial of this novel contrivance is to be given upon the dry districts of New South Wales, and the result is looked forward to with interest by some of the residents of that colony.

* * The first experiment with electricity as a motive power on the New York elevated railroads will be made on the Second-avenue line. A central rail, twenty pounds heavier than those now in use, will be laid between the rails from Chatham square to the Harlem River terminus. Electricity will be conducted from the dynamos to the central rail by a large wire. The rails will be insulated, but the present tracks will remain as at present. All the electric railway companies will be allowed equal facilities for the experiments with the motors, and the expense of laying the rail will be divided between them. A commission, to be selected by the companies, will decide on the relative merits of the inventions.

* * The magnitude of the forestry products of the United States is shown by recent statistics. These demonstrate that notwithstanding the enormous value of the corn crop, it is slightly exceeded by the annual value of the forest products. The following remarkable figures show the value of the principal products of the country in their regular order for the year 1883: Forestry, $700,000,000; corn, $679,714,499; wheat, $474,291,850; hay, $371,811,084; cotton, $280,266,424; oats, $150,243,565; gold and silver, $74,400,000; coal, anthracite and bituminous, $64,500,000; iron ore, $20,470,000; and total other mineral products, $218,385,452. By far the largest portion of the forestry products is used as lumber. As lumber it is used for building material, fencing, and innumerable manufactures; and it also enters into the industries of the people in many forms. It appeared by the last census that the value of the wood used annually in cooperage was $33,714,770. Several million dollars' worth are annually consumed in the manufacture of baskets. The chief of the forestry division of the agricultural bureau states that 2,999,542 cords of bark were used in tanning in 1880, at an average cost of $6 per cord, which would bring the aggregate value of bark up to $17,456,252. This does not include the value of trees cut for bark and left to decay. The lucifer matches consumed in the United States require wood to the value annually of $3,298,562.

* * If we expose, says O. Decharme in the *Comptes Rendus*, a plate of copper to the flame of a spirit-lamp or of a Bunsen burner, or, better, to the fixed and narrow jet of an enameler's lamp, there are produced upon the metal iridescent coronæ around the heated point. If the experiment is well managed there are obtained fixed colored rings, apparently unalterable, in the air. These thermic rings are quite similar to the electro-chemical rings of Nobili; like them they follow one upon another, and are propagated in waves. In both cases the colors succeed each other in the same order, which is that of Newton's rings as seen by transmission. Multiple thermic rings may be produced by means of drums surmounted by two, three, four, etc., gas burners. These same pieces serve equally for the production of the electro-chemical rings by fixing in the fine openings of the tubes needles of steel of equal length for each system. The thermic rings, simple or multiple, approximate the more closely to the corresponding electro-chemical rings as the jets of flame are feebler and less oxidizing.

* * The London *Times* of a recent date in speaking of American labor, says: "A comparison has been instituted between the work of a European employee and one in the United States. It appears that employees of the cotton mills in England work up 2,914 pounds per annum, and those in Germany from 1,200 pounds to 1,500 pounds, while the operatives of the United States work up no less than 4,350 pounds. The amount of wool worked up in England by each operative averages 1,375 pounds; in the United States 1,640 pounds; and in Germany 1,000 pounds. In flax the average is 2,080 pounds for England, and 715 pounds for Germany; in silk, 71 pounds for England, 87 pounds in the United States and 59 pounds in Germany. It will thus be seen that the operative in the United States works up 100 pounds of cotton to 67 pounds worked up by the English operative and 27½ pounds in Germany; 100 pounds of wool against 77 pounds by the English operative and 60 pounds by the German; 100 pounds of silk against 81½ pounds by the English and 60 pounds by the German operative. It is consequently claimed that, as the American artisan furnishes more work in a given time than the foreigner, he is entitled to the higher wages he receives."

* * A very interesting addition has recently been made, says the London *Daily News*, to the Zoological Gardens in the shape of an electric eel—*Gymnotus electricus*. It is said to be nearly six feet in length, and must therefore be one of the very largest specimens of its kind.

Humboldt, when in the native home of this fish in and about the Rio Colorado, measured some that were 5 feet 5 inches in length; but though the Indians said there were larger, he himself saw none. The captive in Regent's Park is no doubt therefore a very big specimen, and there can be little doubt of its power. Humboldt thought that the Indians of the locality referred to had exaggerated ideas on this subject, but they no doubt had had practical experience, while the illustrious traveler seems to have prudently refrained from testing the matter, except in the case of an eel in a somewhat exhausted condition. He admits that it would be temerity to expose one's self to the first shocks of a large and strongly irritated gymnotus; and though he does not mention any case within his knowledge of any human life being lost by a shock from the fish, the mode of catching them adopted by the Indians seems to render it by no means incredible that, as some have asserted, this fish is capable of killing a man.

The Indians, it seems, are accustomed, when they want to catch gymnoti, to scour the country round for wild horses and mules, which they drive into the ponds where the fish are known to be; and so violent are the discharges of the pent-up lightnings to which these animals are exposed that, though they are not actually killed by electricity, they are so stunned and disabled that usually several of them are drowned. Humboldt once imprudently put both his feet on an electric eel just taken out of the water; and though he does not speak of it as a large one, he says he never experienced from a large Leyden jar a more dreadful discharge than he felt on that occasion. He was affected all day with a violent pain in every joint of his body.

* * National figures and statistics, presented in whatever light and form they may be, are very interesting subjects of study, and give a very fair idea of the financial and other relations which the States bear to the economy of the civilized world. The six great nations in the world's history of to-day, from their dominant commercial and political positions and influence, are Great Britain, Germany, France, Russia, Austro-Hungary and the United States. The respective wealth of these is preponderating, and in the aggregate foots up the enormous sum of $184,205,000,000.

These States come in the order of precedence as follows:

United States	$43,642,000,000
Great Britain	43,366,000,000
France	35,898,000,000
Germany	29,403,000,000
Russia	17,134,000,000
Austro-Hungary	14,762,000,000
Total	$184,205,000,000

The respective populations of the countries named were given in 1880 as follows:

United States	50,155,783
Great Britain	29,702,727
France	36,905,788
Germany	45,194,177
Russia	87,795,981
Austro-Hungary	37,741,434

On the basis of this the distribution of the wealth given per capita would represent something like this: United States, $872; Great Britain, $1,451; France, $972; Germany, $656; Russia, $195; and Austro-Hungary, $391. As a matter of course, these figures, from the very nature and character of the subject involved, are highly approximative, although based on "Munhall's Balance Sheet of the World," and other authorities, which are probably as reliable and as much quoted as any other upon the subject. The increase in the wealth of the countries referred to has been very marked in the past two or three decades, and the ratio of the percentage of the relative increase is very significant. An analysis of this wealth, or rather an inquiry into the channels of its distribution, would afford infinite valuable information for comparison. For instance, the census report of 1880 gives the following distribution of the wealth of the United States.

Farms	$10,197,000,000
Residence and business real estate	9,881,000,000
All real estate exempt from taxation	2,000,000,000
Railroads and equipment	5,536,000,000
Telegraphs, shipping and canals	419,000,000
Live stock, farming tools, and machinery	2,406,000,000
Household furniture, clothing, paintings, books, jewelry, household supplies of food, fuel, etc.	5,000,000,000
Mines, etc., with one-half the annual product	781,000,000
Three-fourths the annual product of agriculture and manufactures and of imports of foreign goods	6,160,000,000
Specie	612,000,000

It also supplements this with the annexed table, showing the relative increase in the percentage of three decades intervening between 1850 and 1880:

	Valuation.	Per cent. of increase
1850	$7,136,000,000	....
1860	16,160,600,000	126.4
1870	24,055,000,000	48.9
1880	43,642,000,000	81.4

From the above statement, it will be seen that between the periods of 1850 and 1880 the wealth of the United States increased, in round figures, six-fold, while that of the population but barely doubled itself.

* * The American Institute Industrial Exhibition, 3d avenue, 63d and 64th streets, New York, which has been now open for several weeks, is unquestionably the finest and best attended of any that have before taken place. Not only are the exhibits more numerous than has ever before been the case, but they are of greater novelty, of better character, and far more interesting and attractive than usual. The general opinion of all visitors, who daily increase in numbers, is that the fair this year is better than any of its predecessors.

Several curiosities have lately been added which greatly tend to increase the pleasure of a visit to the building, notably among which is the stove used by the Greeley Relief Expedition, and around which Lieut. Greeley and his comrades were resuscitated when found almost dead from cold and starvation. This stove is small but massive, and it is claimed for it that it has traveled farther North and nearer the Pole than any other utensil of the kind. It looks as if it had done good service, and is draped with the national flag.

Another article which is attentively scrutinized and discussed is a new velocipede, or uni-cycle for traveling on the ice. The wheel is supported on and runs through a triangular base which rests on the ice on runners. It is provided with small spikes which grip the ice as it revolves, thus furnishing the motive power. It is said by the inventor to have made marvelous performances and it is next to impossible to upset it. It looks to be serviceable, and no doubt will be greatly fancied by those who have the courage to try it.

In the miscellaneous department there are to be seen a great variety of novelties, and among these are the appliances for writing and saving labor in the shape of type writers and stylographic pens, among which the Kerner Pen appears, of an entirely new construction. It is supplied with a vibrating tube attached to a flexible diaphragm, and a capillary needle for the operation of which insures perfect action.

The Hammond Type Writer, which is exhibited on a stand in the gallery by the side of the Greeley Arctic Outfit, is undoubtedly the best of the kind and far exceeds in merit any machine of the kind ever previously in use. It is so simple that a mere child could use it, and it is all but impossible for it to get out of order. There is no chance of two letters coming together and throwing the mechanism out of gear, as on other type writers, while the alignment and spacing are simply perfect. It works on both upper and lower case, and is calculated to fill a want long felt, viz.: that of speedy work, clearness of type, and certainty of action.

The pleasures of a visit to the Fair are greatly enhanced by the excellent music rendered each afternoon and evening by Conterno's Ninth Regiment Band.

The exhibition will probably be prolonged until Dec. 6th, although it was the original intention to close on the 29th inst.

Regarding an "electrical rainbow," Mr. R S. Newall, of Ferndene, thus writes to *Nature* on September 3: "I was one of a deputation of River Tyne Commissioners, in England, who visited the South Foreland to see the experimental lights now on trial there, on Saturday night, August 30. We were walking across the fields from the lights toward the observing hut No 2—a distance of about a mile and a half. There was a fog, more or less, and a shower of rain as we were approaching the hut, and every time the electrical light from "A" tower revolved a rainbow, very like a faint lunar bow, made its appearance. I could not see any prismatic color, and the bow was only produced by the large electric light, with carbons of one and one-eighth inches in diameter. There was no bow visible from the old light, which has carbons of about three-eighths of an inch square, and none from either the gas or oil lights. I was informed that this was the first time such a phenomenon had been observed."

The Distribution of Electrical Energy.

M. Gaulard, writing from the Turin Exhibition on the 15th October, sends the following communication to the editor of *La Lumiere Electrique:*

"In the the number of *La Lumiere Electrique* for October 11th, you published a communication from Professor Colombo on the experiments made at the Turin International Exhibition of Electricity by means of the secondary generators of Gaulard and Gibbs. This communication was preceded by an article in which M. Marcel Deprez seeks to show that the invention is not novel, that it has no scientific value, and that from an industrial point of view it is not patentable; and, in fine, that it is not susceptible of any useful application.

"Being directly concerned as the inventor of the system of the distribution of electric energy, which is the subject of this article, I think I may claim from your courtesy the insertion of the following rectification:

"In reply to the first point, I must remind M. Marcel Deprez that Professor Colombo's communication contains literally the following sentence: 'These apparatus are composed in principle of two helices, formed very ingeniously of discs of copper superimposed on and insulated from each other, the discs or spirals of one helix comprising between them those of the other.'

"Now, I do not believe that the earlier researches of M. Marcel Deprez, Sir C. Bright, and M. Jablochkoff, on the phenomena of induction effected by means of Ruhmkorff's coils, can be confounded with those undertaken by means of the instrument above described, and which differs from Ruhmkorff's coil, not merely in its form, but in the fundamental principle of its construc ion, which I have claimed a long time ago, and which consists in the absolute necessity of the equality of the inducing and induced masses, and the symmetry of their position with respect to the magnetic field, in order to obtain the maximum yield in the recovery of the transformed energy.

"Therefore, until M. Marcel Deprez shall have demonstrated that an apparatus similar in form and principle has been constructed by himself or others, I shall consider myself as the inventor of the new arrangement, both from a scientific and an industrial point of view.

"As regards the novelty of the results, the controversies carried on to the present day on the yield of secondary generators prove that our predecessors have never even conceived the possibility of obtaining them.

"Measurements, which I consider as exact, have been taken at the Turin Exhibition by the members of the international jury by a method, the defence of which I leave to MM. Joubert and Mascart, since an instrument invented by the latter of these *savants* was used in these determinations.

"These measurements establish that the apparatus which we submitted to the examination of the jury furnish, when employed to produce the work for which they were constructed, a yield of 89 to 90 per cent. The apparatus measured by MM. Joubert and Pottier was represented by us as furnishing an electric work of 2-horse power, or 1,492 watts, under the influence of a primary current of 12 amperes. This apparatus, composed of 1,000 copper discs, of 12 centimeters external diameter, with a space of 5 centimeters in the center, and of $\frac{1}{4}$ millimeter in thickness, forms a column of 15 centimeters in diameter, and 55 centimeters in height.

"The weight of the copper employed is 20 kilos., and the price consequently, is 60 francs. M. Marcel Deprez has, therefore, misinterpreted the communication of Prof. Colombo when he affirms that the mere price of the copper used in the construction of our apparatus amount to 17 francs per Edison lamp, since with 60 francs' worth of copper we construct an apparatus capable of supplying 18 to 20 16-candle lamps. Thus, though M. Marcel Deprez pretends that it will be easy to find varied arrangements answering the same end, and which are certainly public property. I still doubt whether, in spite of his inventive genius, he will be able for a long time to find a more economic arrangement.

"There only remains the question whether our apparatus are capable of rendering industrial service. But all along, or at least since the learned researches of M. Marcel Deprez and his predecessors have given a powerful impulse to the utilization of the phenomena which electricity is capable of producing, the great concern of electricians has been to find industrial means of distributing electric energy. Without criticizing here researches previously undertaken in this direction, we can say that no practical result has been secured in competition with that given by our secondary generator. I do not require to tell M. Marcel Deprez that one of the essential conditions for transmitting energy to a great distance is to give to the work transmitted the form of small quantity and high tension. But as, on the other hand, we do not know of any other instrument capable of utilizing industrially this form of energy, save the machine which he has promised to construct, we thought that it would be simpler, more logical, and consequently more useful, to search out the conditions of the industrial establishment of apparatus capable of transforming energy transmitted to a great distance, so as to render it utilizable by all apparatus, lamps, and machines which modern industry has at its disposal.

"M. Marcel Deprez urges as an objection against us the necessity of employing for the working of our system for the distribution of energy, alternating current, which he pronounces dangerous. Not only is it possible for us to use currents of a uniform direction if they are interrupted or undulated, but we have good reasons for giving the preference to alternating currents. The first is that the principal circuit supplying all the secondary generators is closed metallically at the limits of the generator, whence it results that the points of the circuit which might be touched by consumers cannot have, at most, a difference of more than 100 volts, which is far from being formidable. On the other hand, I do not believe that the system of transmission of energy by means of continuous currents, such as Marcel Deprez proposes to establish offers a greater security. But the principal reason which leads us to adopt the alternative form for our primary currents is the simplicity with which great work may be obtained by means of known types of machines with alternating currents, whilst it seems to me very difficult, in default of proof to the contrary, to place upon dynamo machines with continuous currents, collectors capable of gathering great electromotive forces. Lastly, as to the independence of the apparatus it is absolute on our system. It is incorrect to say that the working of the lamps fed by our generators is compromised by the extinction of a single lamp, or of several for the mobility of the magnetic field of our apparatus enables us, on the contrary, to vary at will the intensity of the current developed in their secondary circuit.

"As for the reproach urged against us that we can distribute merely light, if it were merited, still the fact of being able to utilize natural forces at a distance for lighting up towns might satisfy the most impatient. But the difficulty signalized of producing an economic motor, by means of alternating currents, does not alarm us. If, for the production of motive power and for electrochemical work, it is useful to have continuous currents, we shall effect on the secondary generators the same rectification of the current, as it has to be done with ordinary dynamos. It will be easy for us to supply to all kinds of machines the form of energy most suitable for their action, so that we have solved by the simplest method, not merely the question of the transmission of power to a distance, but the much more important problem of its distribution. But for the present we will simply claim the facts established and for which our priority cannot be called in question.

"The experiments at Lanzo have taken place, not merely in presence of the jury, but have been repeated with complete success before the Italian Minister of Public Works and more than 300 Italian engineers and architects assembled at Turin by occasion of the fifth Congress.

"For five consecutive hours, the stations of Turin, Venario and Lanzo, connected with the gallery of the exhibition by means of a circuit of 80 kilometers of chrome bronze wire, 3.7 millimeters in diameter, having a conductivity of 98 per cent., and courteously placed at our disposal by the firm Mouchel, have been lighted up as follows:

"The station of Turin with 34 16-candle Edison lamps, 48 8-candle lamps and one Siemens lamp; the station of Venario by two Siemens arc lamps; the station of Lanzo with nine Bernstein lamps, 16 Swan lamps of 100 volts, one sun-light and two Siemens arc lights. At the exhibition there were burning nine Bernstein lamps, nine Swan lamps and one sun lamp, and in the Figaro kiosk, served by a small type secondary generator, five Swan lamps.

"In the face of these results the jury awarded to MM. Gaulard and Gibbs the grand prize of 10,000 francs, given by the Italian Government. In spite of our invitation of January last, M. Marcel Deprez had the kindness not to come and contest it with us. Further, the fifth section of the Congress of Italian Engineers and Architects closed its works with the following order of the day:

"'The fifth section of the fifth Congress of Italian Engineers and Architects assembled at Turin in 1884, cannot overlook the great importance of the experiments on the transmission of electric energy to great distances, conducted at Turin by means of the secondary generators of Gaulard and Gibbs, and having been able to appreciate the working of this system of distribution expresses the wish:

"'That government, municipal bodies and manufacturers may support the establishment of this system, and that the hopes may be realized which six months' experience on the Metropolitan Railway of London, the experiments at Turin-Lanzo, and the sound conceptions on which this system is based, have excited in the scientific and industrial world.'

"The sole conclusion to be drawn from these facts is that the distance from Paris to Turin is too great to permit M. Marcel Deprez to judge the case with a full knowledge of the circumstances. But the illumination of the stations on the railway Torino Cirie-Lanzo will be continued until the close of the exhibition, and the quarantine being now suppressed, the difficulty in the way of a full examination by those interested is considerably diminished.

"However this may be, it is with a legitimate satisfaction that, in the midst of the wonderful signs of the development of Italian industry, of which Turin is at present the theater, I have kept the flag of France at the head of the progress realized by the applications of science to industry."

.... The Baltimore & Ohio Telegraph Company have taken possession of the telegraph lines along the New York & Western Railway, between Cornwall and Oswego, with various branches, under a contract with that company, dated August 1. These lines have heretofore been operated by the Western Union and Atlantic & Pacific. The Western Union Company claimed that one of the wires on the line had been originally erected by the Atlantic & Pacific Telegraph Company, and now belonged to the Western Union. In order to protect its contract with the Baltimore & Ohio, the railway company has obtained an injunction to restrain the Western Union Company from removing or interfering with said wire or line.

—— A new corporation, named the Pittsfield, Mass, Electric Light Company has been formed with the following officers:

President—Abel Wheeler; Treasurer—Edward S. Sears; Directors—Abel Wheeler, Frank A. Sawyer, Edward Sears.

The capital stock is $50,000; paid in $150.

ELECTRIC LIGHT NEWS

—— The Grand Rapids Electric Light Company are now operating by water power 280 arc lights in the city of Grand Rapids, Mich.

—— The *Mouvement Industriel Belge* says that the insurance companies refused to take the buildings of the Antwerp Exhibition of next year if gas were used in the interior, and so the buildings—or at any rate the main portions—are to be illuminated exclusively by the electric light. Independently of the motive power, about 350 horse-power, it is estimated that the expense will amount to about 80,000f., or £3,200, unless the electric light companies switch on some current gratuitously. We further learn that the committee of the electrical section is actively deliberating the matter, but that the details are not yet decided, on account of the expense.

—— Preece's experiments show that the luminous power of an incandescent lamp increases as the sixth power of the intensity of the current. Since the energy expended increases only as the square of the intensity (or even less if we take account of the diminution in the resistance of the filament when the temperature increases) it follows that the luminous power varies as the cube of the energy expended, and unfortunately the duration or life of the lamps diminishes rapidly with the increase of light. It would, therefore, be interesting to know the relation which exists between the life of a well-constructed lamp and the intensity of current.

—— We are informed that the Swan Incandescent Electric Light Company, whose factory is at 128 Hampden Street, Boston, Mass, and which stopped business some two or three months ago, has concluded to remove from Boston. It has made arrangement with the Brush Electric Light Company, of Cleveland, O., whereby that concern shall take possession of all the Swan Company's property there, and the plant is now being packed up and shipped as rapidly as possible. The stock of the Swan Company is held largely in New York and Cleveland, the Brush Company, it is said, being a large holder, and it is through these parties that the new deal has been made. The company is composed of very wealthy men, and a gentleman has been sent there from New York, who is paying all bills as fast as presented, and superintending the removal.

—— The car on the Dedham branch of the Providence road, which is lighted by electricity, is a favorite with passengers. The light is more brilliant than that of oil and is perfectly steady and safe and cleanly. The system used is known as the Trouve, and was described by the ELECTRICAL REVIEW. It consists of a wooden trough in which are fitted from four to six ebonite cells, each containing one zinc and two carbon elements. The elements are connected by means of movable clamps, and are attached to a windlass by which they are raised from or lowered into the exciting solution, as required to regulate the intensity of the current. A wooden stop, which may be pushed aside when necessary, prevents the elements from being entirely raised from the cell, while the height of the crank allows of the cells being removed for emptying and refilling. A spindle covered with india rubber supports the elements, the zinc being notched at the top to facilitate their fixation or removal, thus enabling them to be reamalgamated and rapidly rearranged. The car using incandescent lights produced by the Trouve battery makes several trips to and from Dedham every evening This system is controlled by the Domestic Electric Light and Power Company of this city, and it is claimed by them that they can light cars and residences at an expense not greater than that of gas at $2 per 1,000 feet.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING NOVEMBER 25, 1884.

308,416 Electric Time Detector; Anatole Lasmoles, Chateaureaux, France.

308,432 Electro-magnetic car uncoupler; John D. Reed, York, Neb.

308,487 Electricity gage; John Goodman and Henry M. Goodman, Louisville, Ky.

308,492 Apparatus for controlling railway signals by electricity; James T. Hambay, Pittsburgh, Pa., assignor to the Union Switch and Signal Company, same place.

308 493 Circuit closer for railway switches; Jas. T. Hambay, Pittsburgh, Pa., assignor to the Union Switch and Signal Company, same place.

308,494 Apparatus for controlling railway appliances by electricity; James T. Hambay, Pittsburgh, Pa., assignor to the Union Switch and Signal Company, same place.

308,521 Electro mechanical clock; Chester H. Pond, New York. N. Y.

308,533 Electro-mechanical signaling apparatus; M. Toulmin, Washington, D. C.

308,534 Electric motor; Gustave Trouve, Paris, France.

308,566 Combined telephone and automatic fire alarm system; Thomas D. Lockwood, Malden, Mass.

A printed copy of the specification and drawing of any patent to the annexed list, also of any patent issued since 1865, will be furnished by any of the patent solicitors whose advertisements appear in this journal. In ordering please state the number and date of the patent desired.

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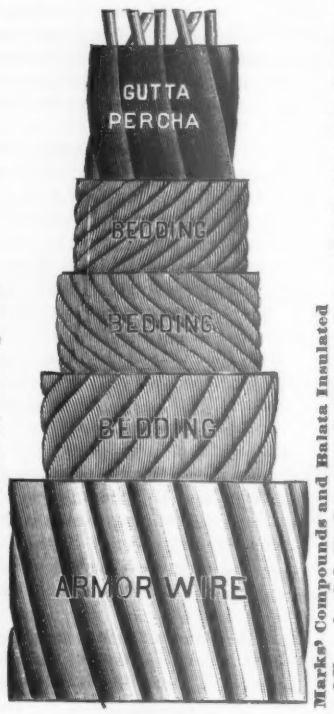

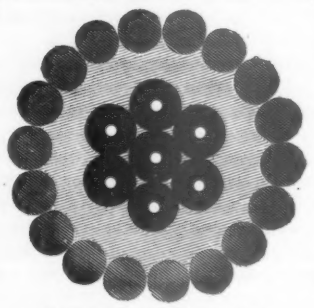

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